



REPORT
ON
MEDICAL & HEALTH WORK
IN
THE SUDAN
FOR THE YEAR
1927.

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SUDAN MEDICAL SERVICE.

ANNUAL REPORT

1927.

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GENERAL REMARKS.

The rains in the central Sudan were considerably above the average and as a result malaria became epidemic over this area throughout the latter five months of the year.

It is usual in the Sudan for epidemic malaria to die down towards the end of November, but probably as a result of the absence of any cold weather in November and December, the malarial incidence increased rather than diminished towards the close of the year.

In the southern Sudan the rains were below the average and the malarial rate was not increased.

In the northern Sudan as far as the limits of the rain cultivation area about the 17th. parallel of latitude, the conditions approximated to those of the central Sudan and the malarial incidence was unusually high. To the north of this area the malarial incidence depends on the rise and fall of the river and is not affected by the rainfall.

The incidence both of typhoid fever and malaria was increased throughout the Sudan.

Influenza also was general throughout the greater part of the Sudan.

Relapsing fever had become epidemic in Darfur Province during the latter part of 1926 and the early part of 1927. It had caused a very heavy mortality and had given rise to much anxiety. As the year progressed the position became less acute and at the present time the danger of its further spread into Kordofan and the western Sudan appears to have ceased. The disease should be well under control before the next rainy season sets in.

With the above exceptions the health of the Sudan has been generally satisfactory.

Health of Officials.

The following list shows the number and percentages of officials, classified according to nationality placed on the sick list:—

Sickness of classified officials 1927.

NATIONALITY.	No. of officials employed.	TOTAL		Average days' sickness	
		Placed on sick list.	No. of days' sickness.	For all officials.	For those who were sick.
British	916	272	4,355	4.75	16.01
Other Europeans	80	3	139	1.74	46.33
Egyptians and Syrians ..	1,667	273	3,904	2.34	14.30
Sudanese	2,102	440	4,314	2.05	9.80
Other non—Europeans ..	34	—	—	—	—
TOTAL	4,799	988	12,712	2.69	13.07

EPIDEMIC DISEASES.

(1) RELAPSING FEVER.

This disease which is the lice-borne variety first appeared in French West Africa in July, 1921. It spread across Africa unchecked reaching Darfur in September, 1926. It appears to have first established itself in the Gebel Murra area and from there to have spread to the Zalingei, Nyala and Kebkebia districts. The mortality in untreated cases was very heavy 60—80 per cent. and by the end of the year 1926—10,000 deaths were estimated to have occurred in Zalingei district alone.

Position at commencement of the year.

At the commencement of the year 1927 the position was as follows :—

The disease had firmly established itself in the Gebel Murra area and the Zalingei and Kebkebia districts. It had extended north to the Kuttum district and south-east into the Nyala district reaching a point within 110 miles of the Kordofan boundary.

The country which had only recently (in 1917) come under administration was difficult to work in, communications were difficult, motor roads few and not good, the people chiefly affected were ignorant, timid and very dirty. They knew no Arabic.

There appeared to be a grave danger of the disease spreading into Kordofan and the central Sudan as up to that time its progress across Africa had remained unchecked. The position in fact appeared to be very serious.

By the middle of February the Medical staff had been considerably increased. A number of subordinate staff trained to give injections of Arsenobenzol and to carry out delousing operations were already at work, and a larger number were under training. Additional motor transport had been sent to Darfur to ensure quick transport of the epidemic staff as far as the condition of the roads would allow.

To meet the immediate danger of spread to the central Sudan quarantine and delousing stations were established in Darfur, Kordofan, the Nuba Mountains, the Bahr-el-Ghazal and the White Nile Provinces.

Progress in 1927.

The control of the disease in Darfur was rendered very difficult by the absence of grain and grazing throughout Darfur excepting only in Zalingei district. For this reason it was impossible to prevent natives from every part of Darfur journeying to and from this heavily infected area.

The difficulty was partly met at a later date by the Government undertaking the distribution of grain, but from first to last the epidemic control work was rendered difficult by this shortage of grain and fodder. This state of affairs was remedied by excellent rains occurring in the autumn of 1927.

In spite of these difficulties considerable progress was made and by the time of the onset of the rains in July the position was as follows :—

The Nyala district to the east of Nyala town was clear. The disease had greatly decreased in the Zalingei and Kebkebia areas, but sporadic outbreaks continued to occur in these and the Kuttum districts and in western Nyala. The Gebel Murra area, a tangle of mountains and upland valleys situated in the

centre of Darfur remained infected and was continuing to act as a centre of dissemination. There was a centre of infection in the western El Fasher district.

During the rains active epidemic work had to be discontinued owing to the difficulty of transport at that time and the necessity of leaving the people free to cultivate in order to avoid a recurrence of famine conditions. Fortunately there are two factors which militate against the spread of this disease during the rains :—

(i) The people do not travel.

(ii) They leave their villages and live apart, each on his own cultivation.

On the conclusion of the rainy season work was recommenced and by the end of the year the position had markedly improved.

Position at the end of the year.

The position was now as follows :—

The Gebel Murra area was practically free from the disease. This was a great step in advance as this mountain area owing to its central position and to the fact that people from every part of Darfur visit it to buy pepper, salt and wheat, had always acted as a centre of dissemination of the disease. Kebkebia and Nyala areas were almost free of the disease. On the other hand outbreaks were occurring in the northern area and in the southern-eastern area towards the Wadai border.

In view of the improved position generally and of the fact that such outbreaks as there were were either in the northern area or towards the Wadai border and thus did not constitute a direct threat to Kordofan and the central Sudan, it was decided to abolish all quarantine delousing stations both in Darfur and in the neighbouring provinces.

Course of action to be followed until new outbreaks at an end.

We are no longer, as at the end of 1926, dealing with a widespread epidemic affecting large areas in their entirety and progressing unchecked among a people who had no understanding of the origin and causes of the disease, and who fearing all interference, concealed in every way possible the existence of disease in their villages. The present position is rather that of a series of isolated sporadic outbreaks occurring chiefly in the north and south-west and thus no longer constituting an active threat to the rest of the Sudan.

In the meanwhile the comprehension and confidence of the headmen of the tribes and villages has been largely won. Roads have been improved and increased in number, and rapidity of movement has thereby been greatly facilitated.

Widespread delousing operations and rigid quarantine are no longer required. Everything is being subordinated to obtaining prompt information of any new outbreak so that it may be dealt with at once. Delousing operations are reduced to a minimum where early information of an outbreak is given and the supplier of information is rewarded with money. Growth of confidence among the people and the improvement of roads are steadily progressing factors and are favouring the complete control of the disease.

It is hoped that Darfur will be free from this disease before the rains set in July.

Provision for the future.

Darfur from its situation as a border province is especially liable to be affected by epidemics, and owing to the difficulty of its communications with railhead at El Obeid, it is difficult to move up medical staff and supplies to meet an epidemic emergency without considerable delay.

It is especially important then that all epidemic outbreaks should be immediately reported and that there should be staff available to deal with any such outbreak at its commencement before, as in the case of this relapsing fever outbreak, it has become a widespread conflagration.

To ensure this immediate information it is necessary to gain the complete confidence of the people in medical matters. With this object in view it is proposed to establish small dispensaries, staffed by native subordinate staff (*i.e.* Dispensary Hakims) at various nodal points throughout the Province. It is believed that here as elsewhere these Dispensary Hakims would gain the confidence of the people and would receive early information of any outbreak of disease. In such a case a Dispensary Hakim would send immediate information to the British doctor in charge of the area and to the administrative official concerned and would himself proceed to the affected village and take the necessary action.

In a province situated as is Darfur frequent epidemic outbreaks are to be anticipated and unless steps are taken to ensure their being dealt with promptly, considerable loss of life and derangement of the routine of administration will occur.

The essentials in anti-epidemic work are :— Intelligence, communications, transport and staff. Communications and transport are being improved. The establishment of these dispensaries will ensure prompt information and will provide staff to meet the initial outbreak.

(2) MALARIA.

Malaria became epidemic during and after the rains throughout the whole of the central Sudan and the northern Sudan south of the 17th. parallel. This is always the case when the rains are good, but on this occasion the epidemic was unusually prolonged owing to the absence of any cold weather in November or December.

Gezira irrigated area.

Malaria was general throughout the Blue Nile Province as a result of the heavy rains, but it was more intense in the irrigated area.

The number of cases treated in the 20 Gezira dispensaries during the period September to December, 1927, was 2,160 as compared with 357 in 1926, while in the three dispensaries outside the irrigated area, it was 1,457 as compared with 336 in 1926.

The infections were nearly all benign tertian and there was an unusual tendency to recurrence. The incidence of the disease increased up to the end of the year.

Conditions in the irrigated area are complicated by the fact that the land is irrigated and as a result of this, heavy rains may fall on land which is often already saturated with moisture and the drying up of the rain water is thus much retarded.

Until it is possible to provide a system of drains to carry off the excess of rain water from the flooded areas or to prevent them becoming flooded, it will be necessary to anticipate malaria becoming epidemic during the rainy season if the rains are good.

It is necessary, therefore, to make every effort to ensure :—

- (i) the universal use of the mosquito-net over this area,
- (ii) the early treatment of all natives as soon as they contract malaria.

It is hoped that by next rainy season every tenant will be in possession of an adequate number of nets for himself and his family.

As regards early treatment there exists at the present time a dispensary for every 15,000 feddan block, and large issues of quinine are made to these dispensaries before the rainy season. That is to say, that every sick man in this area is within easy reach of a dispensary where he can obtain free treatment. The problem is to persuade natives to attend at once for treatment as soon as ever they are conscious of having fever.

The question of malarial prevention in the irrigated area is dealt with under Gezira Sanitation.

(3) TYPHOID FEVER.

The epidemic which had broken out in Omdurman in the autumn of 1926 lasted into the spring of 1927. It died down from May to August, to reappear in the last four months of the year. The total number of cases in Omdurman during the year was 86 with 9 deaths (*See* report by Medical Officer of Health, Khartoum Province).

No other epidemic outbreaks of this disease occurred, but the incidence was increased generally throughout the Sudan. The number of cases occurring in the Sudan during the last four months together with the number of deaths are given below :—

				Cases	Deaths
Khartoum	..	..	..	3	—
Khartoum North	..	..	..	7	1
Omdurman	..	..	..	27	8
El-Obeid	..	..	..	3	—
Wad-Medani	..	..	..	4	—
Makwar	..	..	..	1	—
Kassala	..	..	..	1	—
Atbara	..	..	..	2	—
Port Sudan	..	..	..	1	—
Wadi-Halfa	..	..	..	3	1
TOTAL				52	10

(4) DIPHTHERIA.

The incidence of this disease was increased throughout the Sudan. It became epidemic in Khartoum and Omdurman in July and cases continued to occur until the end of the year.

Sixty-nine cases occurred in Khartoum and Khartoum North and thirty-one cases in Omdurman (*See* report by Medical Officer of Health, Khartoum Province).

A small epidemic outbreak also occurred in Ashkeit in Wadi Halfa Merkaz commencing in September and continuing until the end of the year. 19 cases occurred with 7 deaths.

There was a total of 145 cases of diphtheria in the Sudan as a whole.

(5) SMALL-POX.

A total of 207 cases with 83 deaths occurred in the Sudan. Of these 183 cases with 74 deaths occurred in the Fung Province south of Roseires, the other cases were scattered throughout the Sudan. As regards the outbreak in the southern part of the Fung Province this area has for many years been subjected to epidemics of small-pox and cerebro-spinal fever. The reasons for this special liability are :—

(i) There is a continual passage of Abyssinians to and fro across the border. These immigrants coming from a country where disease is uncombated may be infected with either of the two diseases in question and may thus infect the local population.

(ii) The people in this area have been almost untouched by medical work and, therefore, outbreaks of disease are not reported until they have reached considerable dimensions.

Dispensaries have been established at Kurmuk and Abu-Shencina, but largely owing to the fact that they have been used as quarantine stations rather than as treatment centres, they have failed up to the present to gain the confidence of the people. It is very important in order to save the annual loss of life due to these frequently recurring epidemics, that the confidence of the people in matters of disease and treatment should be gained and that dispensaries in this district should occupy the same position of trust and confidence in the minds of the people as they do elsewhere in the Sudan. In this way it would be possible to ensure widespread vaccinations among these people and also be able to obtain early information of the outbreak of disease.

(6) CEREBRO-SPINAL MENINGITIS.

The Sudan was practically free from this disease except for a severe epidemic outbreak in Mongalla Province in which 426 cases were reported with 242 deaths.

Epidemics of this disease used to be common in the northern and central Sudan and the loss of life involved was very heavy. For the last 14 years these epidemics have ceased to occur. It is probable that the absence of epidemic outbreaks of this disease is to be attributed to the increased confidence of the people, due to the multiplication of dispensaries and the general increase of medical work. As a result of this confidence early information of any epidemic outbreak is obtained and immediate action can be taken. It is hoped that these similar favourable conditions will shortly be established in the Mongalla and the Fung Provinces.

Two cases occurred in the rest of the Sudan, one in Singa and the other in Omdurman.

(7) INFLUENZA.

The incidence of influenza was generally increased throughout the Sudan. 1,237 cases were reported, but this figure in no way represents the actual number of cases that occurred.

Severe epidemics occurred in Abu-Zabad and Nahud in Kordofan Province and in the Eastern District of the Bahr-el-Ghazal Province. In the latter district 60 deaths were said to have occurred out of a population of 20,000.

(8) MEASLES, etc.

Measles was epidemic in Dongola Province during March. Sporadic cases of whooping cough, mumps and chicken-pox occurred throughout the Sudan.

(9) MALTA FEVER.

16 cases of Malta Fever occurred with two deaths as against 12 last year and 11 the year before. Thirteen of these 16 cases occurred at Kassala. Similarly last year 5 out of the total of 12 cases occurred at the same place. It is interesting to note that the Hemitic tribes who inhabit Kassala and the neighbouring country (Halenga and Hadendoa) will not boil milk believing that if this is done the cow or goat or other animal who provided the milk will forthwith become dry. In other parts of the Sudan there is no such prejudice and it is usual for milk to be boiled at once to prevent it going sour.

(10) ANTHRAX.

Seven cases of human anthrax occurred in Tira-el-Akhdar with four deaths. An epidemic of anthrax occurred in the same district in 1925. There were at that time 30 cases of human anthrax with 27 deaths. The origin of the outbreak was at that time traced to an outbreak of anthrax among the cattle of the district.

(11) RABIES.

Two fatal cases of rabies occurred in natives of the Sudan. One at Nyala in Darfur Province and the other at Wau in Bahr-el-Ghazal Province in November. In the latter case the man had been bitten five weeks previously on the lip. Cases of dog rabies also occurred in Kordofan and the Nuba Mountains Provinces.

This disease was first reported as occurring in Darfur Province in 1924, whither it had probably spread from Wadai. An outbreak occurred among dogs and other animals in southern Kordofan in October 1925 and one fatal human case occurred at El-Obeid in December 1925.

It would appear that rabies has definitely established itself among the animals of the Sudan and that human cases will occur from time to time especially in the western provinces.

Seventy four cases of suspected human rabies were treated with a full course of anti-rabic vaccine injections at Khartoum Civil Hospital during the year. These were cases sent up from the provinces. No case of rabies has occurred among those treated. Other cases were treated locally in province hospitals.

ENDEMIC DISEASES.

(1) BILHARZIA.

The known endemic areas in the Sudan are Wadi-Halfa Merkaz, Dongola Province, Berber Province north of Atbara, the White Nile Province, the northern part of the Fung Province, areas in Kordofan and in the Nuba Mountains Province, and Darfur Province.

Of these Dongola Province, Berber Province, Kordofan Province and the White Nile Province have been selected for bilharzia work.

Dongola Province as being the chief internal labour reservoir of the Sudan and thus a dissemination focus of disease.

Berber Province because out of a total of 24 irrigation farms in this province 22 are as yet uninfected. If these large irrigation areas are allowed to become infected it will be an impossible task with the knowledge and remedies at present available to get them clear again.

Kordofan Province because :—

(i) The infected fulas (rain water lakes) lie on the high road from the west into the Gezira, and it is, therefore, important to render them non-infectious and thus to avoid the infection of the Gezira labour supply.

(ii) Many of these fulas are not yet infected and it is hoped to prevent the spread of infection to these non-infected areas.

White Nile Province because :—

(i) It marches with the Blue Nile Province and thus is likely to infect the irrigated area,

(ii) The infection here is continued throughout the year and the debilitating effect on the people is consequently very marked.

Dispensaries and Treatment Centres.

In the course of the year, the number of dispensaries doing continuous bilharzia work, and bilharzia posts have been increased to thirty four.

They are distributed as follows :—

Dongola Province	..	..	10 and 2 travelling posts
Berber Province	..	..	4
Kordofan Eastern District	..	..	2 and 1 travelling post
Kordofan Western District	..	..	5 and 1 travelling post
White Nile Province	..	..	9

Progress.

Steady progress has been made and an undoubted improvement has resulted, but as is always the case with endemic disease the more the matter is investigated the wider is the infection found to be. There is little doubt, that at the present stage of proceedings, were anti-bilharzial measures allowed to be relaxed not only would the infection rate slip back to its former level, but owing to the ever increasing freedom of movement from province to province and from place to place a large number of irrigation farms and other areas which are now free from this disease would become infected. In particular and before everything, it is necessary to keep the Gezira irrigated area from becoming infected with this disease, but this is an issue of such paramount importance that it needs separate discussion.

Systematic bilharzia work was commenced in 1927, except in Dongola where it commenced in 1926. Every effort is being made to combine anti-mollusc work, propaganda, regulations against micturition and defaecation into canals and stagnant or semi-stagnant water, with the treatment of infected cases.

Dongola Province. This province was first appreciably infected in 1919 when Egyptian labourers were employed to dig the canals in a pump irrigation scheme projected at Nuri.

The disease established itself in this irrigated area spread to the other irrigation farms and finally became widespread throughout the province. At that time there was no British medical officer posted to Dongola Province.

Systematic treatment throughout the year was able to be carried out in 1926 for the first time.

20,400 persons were examined, 3,350 were found to be infected, and 3,300 completed treatment, i.e. 17 per cent. of those examined were found to be infected. Examination and treatment had been made compulsory and although from the medical point of a view progress was being made it was considered inadvisable to continue along these lines, and all compulsory measures were abolished towards the close of the year.

During the earlier part of the year 1927 few persons presented themselves for treatment, but towards the latter part of the year they came forward much more freely. In 1927—11,376 patients were examined, 1,829 were found infected and 1,199 completed treatment, i.e. a percentage of 16 per cent. were infected, but as many of those examined came forward for examination because they had the disease, the percentage rate of 16 per cent. is almost certainly too high.

The infection is most severe in the irrigated areas. The rotation of irrigation in these areas is 15 days. The pumps work for ten days and close down for five days. During this period the canals rapidly dry off and any residual pools are treated with copper sulphate (this is now being replaced by Sizolin as being equally effective and more innocuous). The pools left behind by the falling river are similarly treated. The propaganda side of the work has been pushed in every way possible.

Experience in Dongola emphasises how hard it is to get an irrigated area clear of bilharzia once it has become infected.

The Kareima and Zuma infected areas (khor infection areas) are reported to be now free from this disease.

Berber Province. There are 24 irrigated farms in this province; of these only two are as yet infected. Of the 22 non-infected farms Zeidab represents an area of 5,164 acres, Ganditu represents an area of 2,088 acres and Mikeilab an area of 974 acres.

There are four infected areas in which work is undertaken. Two of these are irrigation farms, Bouga and Kitiab, and two are infected river areas, Shereik and Mograt Island.

Kitiab farm was first found to be infected in September, 1926. At the present time this is the most heavily infected area in the province. The position was improving up to the rise of the Nile in the year under report, but at high Nile a large marsh was formed parallel to the river through which all persons going to market had to wade. The snails in this marsh were found to be infected and the heavy re-infections were traced to this cause. This marsh was drained and steps are being taken to prevent its re-forming.

The following list shows the cases examined, treated and re-infected in these areas. It will be seen that the re-infection rate is high; every effort is being made to reduce this by anti-mollusc measures and propaganda to prevent contamination of and bathing in canals.

P L A C E	Ex- amined	Free	Bilharzia	Reinfection or relapses	New cases
Kitiab	682	462	220	34	172
Bouga	523	399	164	31	14
Shereik	129	101	28	17	46
Mograt Island	177	132	45	12	49

The bilharzia staff was seriously depleted to provide staff for relapsing fever work in Darfur.

A total of 1,167 bilharzia cases completed treatment in the course of the year.

White Nile Province. A survey carried out in this province in the summer of 1926 showed that the infections from Aba Island northwards were almost entirely caused by the *bilharzia mansoni*, and were of the rectal type. To the south of this island both varieties occur. The infection incidence in this northern area was very heavy, in many villages as high as 60-80 per cent.; moreover the constitutional effects were severe. Many of the sufferers were profoundly anaemic, and had little resisting power to other diseases.

Since January, 1927, three permanent and seven temporary bilharzia centres have been at work.

The current of the White Nile excepting at high Nile is very sluggish and the banks are shelving, so that the water at the river edge is shallow and slowly moving. In consequence of this, snails of the planorbis variety can be found along the river's edge opposite most of the towns and villages and particularly where the river runs shallow between an island and the shore. It is thus out of the question at any reasonable cost to kill the infected snails opposite the towns and villages.

Reliance had to be placed on :—

(i) Government regulations against defaecation and urination on the river bank.

(ii) Regulations as to the places where water can be drawn from the river.

(iii) Digging wells to replace river water as a source of water supply.

(iv) Widespread propaganda.

(v) Treatment of infected cases.

Since the original survey was carried out in 1926 examinations for bilharzia infection and treatment have both been non-compulsory. It is not possible then to give accurate figures recording the progress made during the year under report, but there seems to be good reason to believe that the incidence of the infection has been considerably diminished and that the health of the riverain population has been improved.

2,310 cases completed treatment.

The percentage of infected cases in those voluntarily examined was found to be 10.9 per cent. as against the far higher figure of 70.4 per cent. in the 1926 preliminary survey.

The percentage infection found in Dueim school was 15 per cent. as against 100 per cent. found in 1926.

Apart from the all important question of protecting the Gezira canalisation system from this disease, there would appear to be an especially strong reason for the continuation of bilharzia work in this province on the ground of the debility caused by this disease under the conditions of continued exposure to infection throughout the year and the improvement in general health that has already taken place as a result of a year's anti-bilharzial work.

Kordofan Province. There are two endemic areas in this province :—

(i) The central area around Um-Ruaba, Rahad and the Khor Abu-Habl.

(ii) The southern area around Abu-Zabad, Muglid and the Dago mountains, but fortunately stopping short of Lake Keilak.

The Central Area. The chief sources of infection in this area are the fulas (rainwater lakes) at Rahad, Um-Ruaba and Sherkeila and possibly to a less extent the various smaller fulas along the course of the Khor Abu-Habl.

There are two permanent and two temporary centres at work in this area.

Before anti-bilharzial work commenced a considerable proportion of the population were debilitated and anaemic, the splenic index was high and splenomegaly was common.

There would seem to be little doubt that here also as a result of two years' work the health of the population has considerably improved.

The cases examined and treated in this area in 1925, 1926 and 1927 are as follows :—

1925	1926	1927
1109	4657	592

The result of the bilharzia examination in the schools is as follows :—

<i>Um Ruaba.</i>				Per cent.
1925	..	..		31.7
1926	..	..		7.
1927	..	..		4.
<i>Rahad.</i>				
1925	..	..		49.4
1926	..	..		20.7
1927	..	..		13.

The Southern Area. This area differs from the central area in several ways. There are many more fulas—they are not all infected. The population is a nomad one. The horse and cattle owning tribes who come here during the rains move south in January, as the fulas dry up, in quest of water and forage for their cattle. Their place is taken by camel owning tribes from the north who need less water. Thus the dispensaries are dealing with a double population, but only the cattle owners are infected with bilharzia.

Included in this area are the Dago mountains inhabited by Nuba (a sedentary negroid race) who are heavily infected.

There are permanent centres at Abu-Zabad and Muglid dispensaries and four temporary centres in the Dago mountains.

Abu-Zabad dispensary has been opened for four years and the confidence of the people has been gained to such an extent that they not only come forward freely for treatment for this disease themselves, but they bring their young daughters, the acid test of nomad confidence.

The following is a comparison of the examinations at Abu-Zabad and Muglid in 1926 and 1927 :—

							Per cent. infected	
							1926	1927
Abu-Zabad	..	..	..	..	..	..	12.1	8.1
Muglid	..	..	..	..	..	..	44.1	29.0

Method of Procedure in Kordofan. Treatment of infected cases will not by itself eradicate this disease.

Treatment of the water by molluscicides is inadmissible. Water is such a sacred thing to the nomad Arab whose very life depends on its careful preservation that any chemical treatment would in his present state of education and understanding engender suspicion and discontent. Propaganda among the nomad whose ideas are limited to summer and winter grazing and the tribe's yearly migration is a very blunt weapon.

The most hopeful line of procedure is the systematic deepening and clearing of the fulas at the watering places thus rendering them inhospitable to the snail and the yearly renewal and extension of these deepened cleared areas, combined with steady treatment of infected cases and with constant simple propaganda.

The problem as to how these fulas become re-infected with snails so soon after they fill, and as to when they become infectious to man remains to be solved. If a snail is unable to survive the cycle of development of the infecting organism until it is four months old then many of these fulas can only be infectious for one or two months before they dry up. Immature forms of the *bullinus* snails have been found in the Kordofan fulas within three weeks of the first filling of the fula. Infected snails have not been found in these fulas before the end of October and even then only a small proportion of the *bullinus* examined were found to be infected.

Blue Nile Province. The Blue Nile Province may be looked on as being at present an uninfected area although a few sporadic cases occur here and there outside the irrigated area. This freedom from infection may be attributed to the scarcity of large fulas (rain water lakes) and to the fact that water is mainly obtained from wells or from the Blue Nile, a quickly flowing river.

The irrigated area extends for a distance of 103 miles from north to south and 41 miles from east to west and is being further extended.

The problem of preserving this area from becoming infected with bilharzia is of vital importance to the Sudan. Moreover if this area becomes infected all future extensions will inevitably be infected.

In the Delta area and in the other perennially irrigated areas of Egypt about 78 per cent. of the population is infected with this disease and 8 per cent. of the total deaths are said to be due to this cause, but were the irrigated area of the Gezira to become infected the position would be even more serious:—

(i) Because in Egypt the cold winter weather affords a period of several months' intermission when infection does not take place, and this rest period tends to lower the intensity and the universality of the infection, but in the Gezira the climate conditions would seldom afford a non-infecting period, even of a month.

(ii) Because malaria is practically non-existent in the perennially irrigated areas in Egypt, but it becomes epidemic throughout the central Sudan during the rainy season and persists until the first cold weather occurs in December, and thus the debilitating effect of perennial bilharzia infection and its lowering of vital resistance would leave the population of the irrigated area with little power to resist the annual malarial epidemic which is inseparable in a tropical country from a good rainy season.

The canals of this area are all heavily infested with bilharzial snails, but the *bullinus* type is much commoner than the *planorbis*. No infected snails have yet been recovered from the canals although a great many have been examined.

Children who have never left the district who are living near to six of the canals were found to be infected with this disease in December, 1926. The details were :—

	Children infected.
Hosh	7
Hamad el-Nil	3
Komr and Radma	3
Tayiba	8
Barakat	15
Abdel Rahman	1

The presumption was that the snails of these canals were infected. These canals in common with the other branch canals have since been systematically disinfested of snails and all infected persons have been put under treatment.

The children in these villages are being carefully watched for any signs of further infection.

Disinfestation of Branch Canals. This was carried out in the non-watering period—May and June. Wherever possible the canals were dried out completely so that all snails were killed. Where this could not be carried out the canals were emptied as much as possible and then systematically treated with carefully estimated quantities of Sizolin dissolved in the water at frequent intervals along the canals so as to bring the strength of the solution to 1-20,000 throughout the length of the canal. All snails were killed by this method.

The branch canals after snail deinfestation rapidly become reinfested from the main canal, but the snails of the main canal are less likely to be infected.

No plan has yet been devised for killing the snails in the main canal.

Widespread propaganda has been carried out in this area pointing out the danger of defaecating or urinating or bathing in canals, and recently regulations have been drawn up to render these actions punishable and are now being enforced.

A survey of the population of the irrigated area was carried out in November and December 1926. 981 persons were found to be infected with bilharzia and were treated. Of these 981—601 were from west of the White Nile Province and 484 were from British and French West Africa (including Wadai and the Tchad district). Seventy-six of these infected cases were natives of the irrigated area and 37 of them were boys and therefore almost certainly infected locally (vide supra).

It would appear then that nearly two-thirds of the infected persons in this area came from west of the White Nile Province and two-thirds of these again came from British and French West Africa. There is a continuous stream of these West Africans, sometimes in parties of 30 or 40, sometimes in twos and threes following the road through Darfur, and Kordofan and crossing the White Nile river into the Gezira. Always on foot, badly clothed and very poor they stay at various places by the way and work to earn enough to carry them on their journey, but all look to the cotton cultivation in the Gezira to provide them with the money needed to pay the expenses of the pilgrimage. The Nigerians and the French West Africans are nearly all pilgrims on their way to the holy places, but the Borgu (natives of Wadai) for the most part come to earn enough money to buy land and a wife and then return to their own country.

Of these West Africans and Wadaians 10 per cent. to 19 per cent. are infected with bilharzia and this continuous infectious stream constitutes a grave danger to the irrigated area. To meet this danger quarantine stations have been established at Kosti and El-Dueim and all pilgrims are deflected to these two places, where they are examined for bilharzia and those infected are detained, housed, fed and treated. When cured they proceed on their journey.

The figures for examinations and treatment at these two places are as follows:—

Dueim Quarantine:—

2,128	Passed through quarantine	} April to December.
328	Were found to be infected with bilharzia and were treated.	

Kosti Quarantine:—

8,793	Passed through quarantine	} January to December
739	Were found to be infected with bilharzia and were treated.	

In addition all Egyptian labourers brought up from Egypt for canalisation and other work in the Gezira are examined at Wadi-Halfa—those found to be infected are either rejected or detained for treatment and are not allowed to proceed to the Gezira until completely cured. The figures for examinations and treatment of Egyptian labourers at Wadi-Halfa are as follows:—

8,232	Examined.
514	Rejected on account of bilharzia.
1,117	Detained for treatment until cured.

By these quarantine measures the largest proportion of infected persons are treated and cured before being allowed to enter the irrigated area, but a certain number of infected labourers find their way into this area from neighbouring provinces, *e.g.* the White Nile, Dongola and Berber Provinces.

It is impossible to prevent this filtration from taking place, but the number of such infected persons finding their way into the irrigated area will be relatively few. It is hoped that a proportion of these will be detected, treated and cured at the Gezira dispensaries. The remainder will remain at large uncured, but as the regulations against urination, defaecation and bathing in the canals become more rigidly enforced the proportion who actually are liable to infect snails in the canals will become less. Any snails in the branch canals so infected will be destroyed when these canals are either dried off or disinfested with Sizolin during the non-watering season, but before this they may have infected local natives and the vicious circle begun. It is hoped too that the bilharzia work being carried out in the White Nile, Dongola and Berber Provinces will each year lessen the number of infected labourers entering the irrigated area from these provinces.

It would seem then that the bilharzia position with regard to the irrigated area is grave, but is not desperate. The strengthening of quarantine measures for labourers and pilgrims coming from the west, the enforcement of regulations against the contamination of the canals, the steady improvement of bilharzial conditions in the other provinces, the annual disinfestation of the branch canals, should all if carefully and conscientiously carried out tend to diminish the risk of this area becoming permanently infected.

If, however, quarantine against westerners and Egyptian labourers is relaxed, if regulations in the Gezira are not enforced, if bilharzia measures in the infected provinces are not carried out and bilharzia is allowed to spread in these provinces unchecked, then this irrigated area will sooner or later become infected and if once generally infected unless some new and far more effective means of dealing with the disease is discovered it will be impossible to eradicate the disease. How serious the consequences of this infection would be under the climatic conditions of the Gezira has been pointed out above.

BILHARZIA SUMMARY.

Organised anti-bilharzia work has been carried out in Dongola for two years and in the White Nile, Kordofan and Berber Provinces for one year. Bilharzia work has been hampered in the latter province by the fact that staff had to be taken away for relapsing fever work in Darfur.

Quarantine stations have been established to treat and cure all western labourers before they are allowed to cross the White Nile river into the Gezira, but there is no way of preventing infected labourers from Berber, Dongola and the White Nile Provinces from filtering in. It is, therefore, very important to deal these infected areas.

In Berber Province there are 24 irrigation farms. Of these only two are at present infected and one of these, Kitiab, was only found to be infected in October, 1926. It is of great importance to prevent these other 22 farms from becoming infected.

The experience of the last year has served to emphasise the difficulty of eradicating bilharziasis from an infected irrigated area. This has been particularly manifest in the case of the Nuri irrigated area in Dongola Province and serves to emphasise the importance of preserving non-infected irrigated areas from infection.

One of the great difficulties at present experienced in dealing with this disease is the time necessary to cure infected cases. It is very difficult for native cultivators and still more for native herdsmen to attend a dispensary for a period of at least 26 days. Were it possible to discover some drug which would effect a cure in 7-10 days the difficulty of this work would be greatly diminished.

Sizolin used on the advice of the Director, Wellcome Tropical Research Laboratories has proved an excellent molluscicide. It is innocuous to animal life in any ordinary dilution and is easy to use. Expense, however, prevents its use for snail disinfestation of the main canal and the main branch canals of the Gezira irrigated area or for the destruction of snails in infected khors, owing to the large quantities of water involved. The problem of dealing with these larger canals remains to be solved. Further information is needed as to how snails find their way into the rain water lakes that form in sun baked depressions far away from the river, and as to the length of time that elapses before these lakes become infectious.

The progress made during this first year of organised work has been encouraging. The incidence of the disease has been diminished and in the White Nile Province an improvement in the health and stamina of the population has been very noticeable.

It is believed that with the increasing comprehension of the propaganda which is being carried out and with the strengthening of regulations against the fouling of water, there will result a steady diminution in the number of reinfections which up to date have been a discouraging side of the work both to the medical staff and to the infected population.

Experience has emphasised the importance of action against this disease being organised, systematic and continuous. It is only by keeping the number of infected persons at a low level, by diminishing the opportunity of these infected persons handing the disease on to snails, by preventing persons exposing themselves to infection by snails, by continual war against infected snails and by a continual unremitting combination of all these modes of action that success in clearing any infected area can be looked for.

Any discontinuance or relaxation of these efforts is followed by reinfection of the snail population and the whole vicious circle of transmission from snail to man and from man to snail is recommenced.

(2) MALARIA.

Northern and Central Sudan. There is a tendency for malaria to become endemic in the irrigated areas of the central and northern Sudan. Every effort is being made to ensure the restriction of the malarial incidence to the rainy season and to diminish it as much as possible during this season.

(See "Sanitation Gezira Irrigated Area.")

Southern Sudan. Malaria is endemic throughout the southern Sudan. Observations at Malakal and in the Nuer district suggest that the negroid native in his natural state suffers considerable disability from this disease and is often temporarily incapacitated by it. His native customs, however, protect him to some extent. He covers himself with a thick coating of ashes, and he sleeps in a cattle hut dense with smoke. The negroid native who has adopted Arab customs becomes more susceptible to malaria, but is still less susceptible than the Arab of the north.

Of 288 cases admitted since February first to Malakal civil hospital as malaria and confirmed microscopically 73 per cent. were Arabs, 15 per cent. Shilluk, 9 per cent. Dinkas and 3 per cent. Nuers.

The Arabs were drawn from the clerks, merchants and small shop keepers of the town itself and so would be the most likely to seek admission. The Shilluks are the native negroid tribe represented in the greatest number in the town and its vicinity.

Of 67 cases admitted to Malakal civil hospital in November and December :—

- 61 cases were benign tertian
- 5 cases were malignant tertian
- 1 case in an Arab from the north was quartan.

Preventive Measures.

Anti-mosquito measures beyond the limits of the larger towns are impracticable in the southern Sudan as a means of mosquito prevention.

Slow diminution in the malaria incidence can be expected from :—

- (i) A steady general raising of the standard of nutrition and comfort.
- (ii) Diminution of other debilitating diseases and in particular worm infestations.
- (iii) Early treatment of malaria cases.
- (iv) Widespread use of mosquito-nets.

A steady improvement in nutrition is to be anticipated from agricultural development, and localised famines will be increasingly obviated by improved communications.

(ii) and (iii) can best be ensured by a steady increase of dispensaries staffed by Sanitary Hakims recruited from the south and trained at Malakal, in order to bring treatment within reasonable reach of all natives in the southern area.

Mosquito-nets are much appreciated by the negroid native and it should be possible to greatly increase their sale as the purchasing power of the native increases.

(3) BLACKWATER FEVER.

Fifteen cases of blackwater fever were reported in the Sudan in 1927. Of these five died.

Of the fifteen cases two were Europeans, one Syrian and the rest natives of the Sudan. The following table shows where cases occurred :—

	Europeans		Natives	
	Cases	Deaths	Cases	Deaths
Khartoum	1	—	1	1
El Obeid	1	1	3	—
Wad Medani	—	—	1	1
Nahud	—	—	2	—
Makwar	—	—	1	—
Malakal	—	—	3	1
Talodi	—	—	1	—
Mefaza	—	—	1	1
	2	1	13	4

(4) ANKYLOSTOMIASIS.

This disease is endemic in Dongola Province, the White Nile Province, Wadi-Halfa Merkaz and central Kordofan.

Examinations in Wadi-Halfa Merkaz point to an ankylostoma infection of 10 per cent. of the population.

In Dongola Province a careful ankylostoma survey was made in 1924 and 11.2 per cent. of the population was found to be infected and at the same time vigorous treatment was instituted.

The school inspections for 1927 show an infection rate of .4 per cent.

Examinations of West Africans at Kosti and El Dueim show a 7 per cent. infection with ankylostomiasis.

(5) TUBERCULOSIS.

There is no evidence to show that this disease is gaining ground in the northern and central Sudan.

The detrimental effects of aggregation in towns and the greater exposure to infection owing to movements of the population are probably fully counter-balanced by better nutrition and greater protection from debilitating diseases such as malaria and bilharzia.

In the south the population has had little opportunity of acquiring immunity and the position will need careful watching. There is evidence to show that pulmonary tuberculosis is very common among the Shilluks, the pagan tribe which has been most exposed to infection and which is at the same time most sedentary. The chiefs are being instructed to ensure the modified isolation of tuberculous infected persons in their own villages.

The following list shows the figures for admissions to hospitals for tuberculosis during the last ten years :—

1918	1919	1920	1921	1922	1923	1924	1925	1926	1927
216	191	219	220	234	251	290	292	371	404
Percentage of total admission rate									
1.5	1.4	1.3	1.35	1.38	1.46	1.46	1.46	1.71	1.55

(6) SYPHILIS.

Syphilis is general throughout the northern and central Sudan. It is also common in certain areas in the south. The people appreciate the value of treatment and where a hospital or a dispensary is within reach they seek medical assistance as soon as they realise that they have contracted the disease.

In areas which are well provided with hospitals and dispensaries the position is not unfavourable. The position will improve as medical assistance is brought within reach of a larger proportion of the population—this depends on the further increase of dispensaries.

Syphilis is second only to malaria as a cause of miscarriage and still-birth ; it is also a common cause of sterility. 36,808 injections of Novarsenobenzol were given for syphilis at the various hospitals and dispensaries during the year.

(7) YAWS.

Yaws is the most widespread and most crippling disease affecting the negroid races of the upper reaches of the White Nile and its tributaries. It is the greatest cause of unfitness for work and unless it can be got under control will be a great hindrance to agricultural development.

Yaws work at Hospitals and Dispensaries.

The “Lady Baker” hospital ship and five dispensaries are working in heavily infected areas. Shambe is the latest opened of these dispensaries and deals with the largest number of cases.

Except in special cases a single injection of Novarsenobenzol is given ; the object being to render the patient non-infectious and so to prevent the spread of the disease rather than to obtain a complete cure.

There are still large areas too remote from dispensaries for patients to be able to obtain treatment.

More dispensaries and improved communications are needed in the heavily infected areas.

Yaws Campaign.

This campaign was begun in February of this year, the object being to take a limited self-contained area and to render non-infectious every infected case within that area.

The Lake Jorr area was selected, a careful census was taken and nominal lists prepared. 3,356 were examined. 3.7 per cent. of these persons were in an infectious stage of yaws.

19 per cent. had injections within the last few years; they showed no signs or symptoms. All the infectious cases in this area were treated and the campaign was continued in the adjacent areas.

Unfortunately political troubles have prevented the results being followed up and tabulated, but enough has been seen to point to the value of the systematic treatment of limited areas.

A total of 29,607 injections of Novarsenobenzol were given for yaws in the course of the year. Of these 16,618 were given at dispensaries and at the hospital ship, and 12,683 were given in the "Yaws Campaign" area.

(8) LEPROSY.

The incidence of leprosy in the northern and central Sudan is very light. As the central Sudan merges into the southern area the incidence becomes heavier and continues to increase until the southern Bahr-el-Ghazal and the Mongalla Province are reached.

The infectious nature of the disease is understood in the northern Sudan and to some extent acted on.

The policy adopted is:—

(i) To emphasise to all Sheikhs and Chiefs the infectious nature of the disease and the importance of relative isolation of lepers in their own villages.

(ii) To avoid any form of compulsory isolation in leper camps or leper hospitals.

(iii) To encourage Sheikhs and Chiefs to bring early cases to hospitals and dispensaries for treatment where such are available.

(iv) To form a certain number of voluntary leper treatment hospitals or camps in areas of severe infection or at important centres.

Leper treatment hospitals exist at Omdurman and Gedaref and have been recently opened at Yei, Kajo-Kaji and Opari in Mongalla Province and at Source Yubo in the southern Bahr-el-Ghazal. A few beds are available for lepers in a special building adjacent to Atbara civil hospital.

The Church Missionary Society's hospital at Lui maintains and treats some 70 lepers in a leper camp near the hospital.

The existing accommodation at leper treatment centres is as follows:—

Khartoum Province:—	Beds
Omdurman	56
Berber Province:—	
Atbara	3
Kassala Province:—	
Gedaref	15
Bahr-el-Ghazal Province:—	
Wau	86
Source Yubo	250
Meridi	209
Yambio	55
Mongalla Province:—	
Kajo-Kaji	75
Yei	75

The Sudan Medical Service is much indebted to the staff of the Church Missionary Society's hospital for the medical supervision and treatment of patients in the hospital at Omdurman.

A report by the surgeon in charge of the Church Missionary Society hospital on the year's work at the leper hospital is given below :—

Report on Leper Hospital at Omdurman by C. M. S. Surgeon.

“ The new buildings, erected in memory of Sir Lee Stack Pasha were occupied on June 9th 1926.

“ The number of inmates, 42 in October 1926, rose to 63 twelve months later. The old buildings have therefore continued to be useful, the new buildings being only designed for fifty patients.

“ Later in the year an attempt was made to discharge all patients considered non-infectious and “ burnt-out ” who had homes to go to. All but three of these were discharged by the end of the year.

“ Six patients died during the period under review.

“ There remained on December 31st 1927 fifty one cases (36 men and 15 women). The places of origin of the lepers under treatment at the hospital is as follows :—

Assuan
Bahr-el-Ghazal Province
Berber Province
Blue Nile Province
Darfur Province
Dongola Province
Kassala Province
Khartoum Province
Kordofan Province
Nuba Mountains Province
White Nile Province

“ Clinically they are divided as follows :—

Group					
I.	Indigent, burnt out	..	..	..	19
II.	Stages II and III (Sir Leonard Rogers and Ernest Muir “ Leprosy ” page 184)	..	..	..	29
III.	Non-infectious, burnt-out awaiting discharge	..	..	..	3
TOTAL					51

“ A card index of patients with anatomical diagrams has been compiled, and the lesions are recorded.

Treatment.

“ In addition to the 51 cases in the hospital, the Church Missionary Society's doctors are treating 17 cases living in their homes ; of these there are :—

Stage I.	..	..	..	..	6
Stage II.	..	..	..	..	6
Stage III.	..	..	..	..	5

17

“ Treatment of all lepers has been on the lines indicated in “ Leprosy ” (Rogers and Muir).

(i) Treatment of Intercurrent Infection.

“Selected cases have received Novarsenobenzol injections.

The Haemoglobin color index of the hospital cases has been tested. No case of anaemia below 75 per cent. was found, and the majority of the men reached 90 per cent. ; the women were usually ten points lower. This rules out malarial and hookworm infections.

(ii) Specific Treatment.

“A definite attempt has been made to adapt treatment to the stage of each patient. Much time has been saved by stopping injections to burnt-out Group I patients.

“(i) Weekly injection of oil of hydnocarpus wightiana has been given over a period of nine months to (a) 30 patients (b) 14 outpatients.

“(ii) Weekly injection of sodium hydnocarpate was given to 14 outpatients over a period of three months.

“(iii) Weekly injection of E.O.T. was given for only one month of this year. It had previously been given to 30 hospital cases and 14 outpatients.

“Those showing the most marked improvement have been under treatment for three years. They were discharged after three months' treatment with sodium hydnocarpate which followed nine months' treatment with oil of wightiana, which had been preceded by E.O.T.

“(iv) Application of caustic. Carbolic acid weekly was used on two nodular cases.

“(v) Administration by mouth of powdered nuts of hydnocarpus anthelmintica. Group I seven outpatient girls were treated for a month but digestive symptoms made it necessary to stop the treatment.

“In the hosh 14 patients were treated for six months. Patients had no digestive symptoms, but showed no improvement. Cases chosen were mainly those who had refused or were unsuitable for more active treatment.

“(vi) Vaccine prepared by Wellcome Tropical Research Laboratories. Three lepers were treated bi-weekly with injections of leprosy vaccine for four months. At the end of this time patients showed increase in weight, but no other improvement.

“Three patients were treated for four months with bi-weekly injections of pyocyaneus vaccine. At the end of four months patients had lost weight.

(iii) Diet and Exercise.

“The Church Missionary Society hospital sisters have given careful attention to the diet, particularly to the frequent supply of fresh vegetables and meat.

“Articles needed in the hospital, angareeb, mats, brushes, etc. are made by the lepers themselves.

“A garden has been started in the new hosh.

(iv) Conclusion.

“There is no doubt that the treatment of stage (I) cases by weekly injection as outpatients is most encouraging. Eight of such patients, under 20 years of age, some of whom have been under treatment and observation for two years, have shown demonstrable improvement, e.g. the small daughter of a man who died some years ago in the leper hospital.

“The treatment of more advanced cases as outpatients appear to be as satisfactory as that of similar cases in the leper hospital. This, however, should only be carried out in close co-operation with the Sanitary Inspector. So carried out, cases in the families of such lepers may come to light which would be missed and continue as sources of infection if the lepers were forcibly removed to hospital. At the same time it is not ideal for stage (II) and stage (III) cases to be at large.

“There is no doubt that the lepers in the hospital are the victims of their own laziness and that sustained efforts must be made to stir them to activity.

“It is certain that no line of treatment followed has proved of any marked benefit so far in the leper hospital, while at the same time many of the very advanced cases seem to be progressing steadily through the stage of elimination.

“Greater experience in adapting treatment to individual cases, and persistent attention to the well-being of the patients as a whole should produce in the future results such as we read of in other countries from recent methods of treatment.”

(9) DYSENTERY.

The following are the figures for admissions to hospitals for dysentery over the last years. The table also shows the percentage of admissions for dysentery to the total admissions for each year of this period :—

				1921	1922	1923	1924	1925	1926	1927
Amoebic	..	..	..	477	390	504	605	483	543	835
Bacillary	..	..	..	89	48	27	111	326	271	337
TOTAL	..	..	..	566	438	531	716	809	814	1172
Percentage of all dysentery admissions to total admissions	}	..	..	3.0	2.4	2.9	3.6	4.3	3.7	4.5

(10) KALA-AZAR.

The incidence of kala-azar in the Sudan is for the most part confined to the Upper Blue Nile and Dinder valleys where it is mildly endemic, but a few scattered cases occurred in various other parts of the Sudan. The following list shows the cases that have been reported in the Sudan during the year, where the disease was probably contracted and the place of origin of the patients :—

Reported from	No	Origin of patient	Probable place of infection
Blue Nile	3	1 from Wad-Medani 1 Ginaw from Singa 1 Jaali from Tokar	Wad-Medani 1
Kassala	2	1 Hadendawi from Gulleseit 1 Omdurman man from Singa	Gulleseit 1 Kassala 1
Red Sea	1	1 Dongolawi from Kassala	Tokar 1
Fung	15	13 Abyssinians 1 Gumsawi from Roseires 1 Furawi born at Omdurman	Singa 7 Roseires 7 S. Fung 3
Total	21		Total 21

It will be seen that 13 of the patients came from Abyssinia. It has been suggested that these persons arrive from Abyssinia already infected with this disease.

Out of 750 Abyssinians passing through the quarantine station at Abu Sheneina dispensary, ten were found to be infected with this disease and these ten had all spent considerable periods in the Sudan previously. These Abyssinians arrive in the Sudan in a half-starved and debilitated condition and it is probable that for this reason they fall an easy prey to kala-azar which is endemic in the Upper Blue Nile and Dinder valleys.

PROGRESS IN MEDICAL WORK.

Further progress has been made during the year under report in bringing medical work within reach of the native population.

The establishment of dispensaries in districts hitherto out of reach of medical assistance tends to increase the work of the province hospitals as the more serious cases are when possible sent to the central hospital for medical or surgical treatment.

The following list shows a comparison between the total inpatients and outpatients treated at all hospitals and dispensaries during the year under report and the three preceding years :—

	1924	1925	1926	1927
Inpatients	19,827	18,637	21,738	26,023
Outpatients	394,418	470,697	833,990	1,096,839

BUILDINGS.

The following new buildings were completed :—

Upper Nile Province :—

Malakal Hospital	Women's ward.
„ „	Kitchen block.
„ „	Administrative block.
„ „	Attendants' quarters.
„ „	Dispensary Hakim's quarters.
Renk Dispensary	Hakim's quarters.
Fanjak „	„ „

White Nile Province :—

Kosti Hospital	Female ward.
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Kordofan Province :—

Abu-Zabad Dispensary	2 Brick huts added for accommodation of detained patients.
	Zeer house.

Kassala Province :—

New Dispensary at Aroma.	
Goz-Regeb Dispensary	2 Brick huts added for accommodation of detained patients.

Red Sea Province :—

Tokar Hospital	completed.
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DISPENSARIES.

New dispensaries were opened at the following places :—

Upper Nile Province :—

Shambe 15 beds.
Fanjak
Travelling dispensaries at Akobo and Nasser.

Dongola Province :—

Gureir
Ghaba

Red Sea Province :—

Akik
Musmar
Port Sudan East side

Blue Nile Province (Irrigated area) :—

Sabi Deleib

White Nile Province :—

Shegeig

BILHARZIA TREATMENT CENTRES.

In addition bilharzia treatment centres were established at the following places :—

Um Gerr	}	White Nile Province
Aba Island		
Shawal		
Fashi Shoya		
Zenouba		
Shabasha		

PROGRESS IN CERTAIN PROVINCES.

Khartoum.

A new X ray apparatus has been installed at Khartoum civil hospital. This installation is adequate for every kind of diagnostic work, and very good results are being obtained.

Further increase has taken place in attendance at the outpatient department. The figures for the last three years are :—

1925	1926	1927
29,640	40,106	47,697

The massage and electricity department shows further increased work. The number of attendances at this department are :—

(8 months)		
1925	1926	1927
698	1,941	2,850

The present accommodation at the hospital is inadequate to fulfil the demands which it is called upon to meet.

In order to provide the necessary accommodation the construction of an European block in the south-east corner of the hospital enclosure has been approved and will shortly be begun.

This will provide good and suitable accommodation for European patients and will at the same time enable the space at the civil hospital heretofore used for European patients to be used for 1st. class native patients.

New pathological laboratories situated in the south-west corner of the hospital enclosure are nearing completion. These pathological laboratories which will be under the direction of the Director, Wellcome Tropical Research Laboratories will enable a closer connection to be established between clinical and pathological work at the civil hospital. The co-ordination thus facilitated should be of great benefit to all concerned: to the patient, the physician or surgeon and the pathologist and also to the student.

Upper Nile Province.

The increase of medical work in this province during the year has been very striking and the energy and ingenuity of the Medical Inspector has been severely taxed to meet the demands for accommodation at Malakal civil hospital.

The increased work at this hospital is shewn in the following statement which shows the inpatients and outpatients treated at this hospital during the last four years and the operations performed during this period :—

	Inpatients	Outpatients	Operations
1924	465	21,984	241
1925	773	52,285	415
1926	1,279	55,876	378
1927	2,370	49,100	475

The nominal accommodation for native patients at this hospital is 70 beds, but it was not uncommonly called on to deal with as many as 250 inpatients. Marquees were erected and every possible expedient was made use of to provide the needed accommodation.

A marked feature is the large increase of Shilluk patients. This highly organised tribe, thickly settled on the river banks has up till now failed to come forward for medical treatment to the same extent as the wider, more sparsely settled, and more yaws-infected tribes to the south. This awakening to the need of medical treatment is likely to be of great benefit to the tribe referred to, which is said to be seriously infected with tuberculosis, leprosy and venereal diseases.

The following list shows the patients treated at dispensaries in 1926 and 1927. Shambe, Nasser, Akobo and Fanjak dispensaries are newly opened this year. Nasser and Akobo are purely travelling dispensaries :

	1926	1927
S.S. " Lady Baker "	5,656	10,616
Renk	7,558	8,444
Melut	5,130	4,061
Kodok	7,912	6,698
Abwong	2,022	5,171
Gambeila	1,628	4,004
Duk Faiwil	2,413	4,175
S.S. " Kerreri "	4,911	18,580
Shambe	—	7,113
Nasser	—	3,388
Fanjak	—	1,777
Akobo	—	297

Including the dispensaries the total outpatients treated in this province was 128,679 as compared with 70,603 in 1926, *i.e.* an increase of 58,076.

In addition to the 2,370 inpatients treated at Malakal a further 2,065 inpatients have been treated in huts attached to the dispensaries.

Yaws.

This disease is responsible for the greater part of the invaliding and temporary and permanent crippling in this province. The special measures adopted against this disease have been referred to under "Endemic Diseases."

The principle of action adopted was that of concentrating on a highly infected area, chosen:—

(i) as being sufficiently under administrative control to ensure every infected person in that area receiving treatment,

(ii) as being an area where it was desired to push agricultural development.

Local Dressers.

In certain of the more controlled areas of the province the chief of each small administrative section is called upon to produce a boy to be trained as a dresser. A course of instruction of a month's duration is given by the Medical Inspector while he is working in the area and in this time it is found possible to teach them the rudimentary elements of first aid. The dressing of wounds and ulcers, the treatment of eye infections and the administration of cough mixture and purges is all that is required of them. These dressers are unpaid and are attached to their chiefs. The cost of their simple equipment, drugs and dressings is about one pound Egyptian per annum. The main object is to ensure the early treatment of abrasions and wounds so as to prevent them developing into the obstinate chronic ulcers which form such a common cause of disability in the southern Sudan.

At periodical intervals the dressers by the aid of pieces of straw render to the District Commissioner a return of the number of cases treated by them and report the spread of diseases and the number of deaths. This organisation has only recently been established, it is in the experimental stage and is being watched with interest. It would appear to be development on the right lines designed to interest the chiefs directly in the health and physical efficiency of their people and at the same time to ensure the early treatment of simple wounds which, left untreated, become chronic ulcers and cause a great deal of disability.

In order to prevent the spread of disease it is necessary to interfere to some extent with local and possibly religious customs. This can only be done safely and effectively through the chiefs.

The following are instances of habits and customs which aid the transmission of infection:—

The passing round of the same pipe alike to the leper, the sufferer from yaws or syphilis, and the healthy man.

The occupation of the same hut by the leprous or tuberculous and the healthy.

The common feeding from the same dish by healthy and diseased.

It is only by interesting the chiefs in matters of health and making use of their influence over the people that we can hope to inculcate caution in daily intercourse with infected persons.

KORDOFAN PROVINCE.

El Obeid. El Obeid civil hospital shows an increase of inpatients of 50 per cent. The existing accommodation is insufficient to meet this increased work.

The construction of a new operating theatre and additional ward accommodation has been approved and it is hoped that these buildings will be completed in the course of the year.

REPORT ON SLEEPING SICKNESS

by

PRINCIPAL MEDICAL OFFICER, SUDAN DEFENCE FORCE

For the Periods 1st October, 1926 to 31st December, 1926
and from 1st January, 1927 to 31st December, 1927.

PERSONNEL.

Province.	Name.
Bahr El Ghazal	Major J. R. N. Warburton, M.C., R.A.M.C. Senior Medical Officer.
„ „ „	El Saghkologhasi Nesib Eff. Baz.
„ „ „	El Yuzbashi Khelil Eff. Jabour, M.C.
„ „ „	El Yuzbashi Joseph Eff. Tannous Nasr.
„ „ „	El Mulazim Awal Emmanuel Eff. Terzian.
„ „ „	El Mulazim Awal Taufik Eff. Minassian.
Mongalla	El Bimbashi Yusef Eff. Derwish, O.B.E. Senior Medical Officer.
„	El Saghkologhasi Negib Eff. Yusef Yunes, M.B.E.
„	El Saghkologhasi Faiz Eff. Suleiman Nassar.
„	El Yuzbashi Abdulla Eff. Mansur.
„	El Mulazim Awal George Eff. Murad Rizk.
„	El Mulazim Awal Mohammed Eff. Emin Talhouk
„	El Mulazim Awal Joseph Eff. Khouri Tabet.

The following changes in personnel are recorded during the period covered by this report :—

El Mulazim Awal Boghos Eff. Shamlan, re-transferred to the Army on 19.3.27.

El Mulazim Awal Fuad Eff. Athnase Saikali, re-transferred to the Army on 1.11.27.

El Mulazim Awal Joseph Eff. Khouri Tabet, transferred from the Army for Sleeping Sickness duty 16.11.26.

El Mulazim Awal Emmanuel Eff. Terzian, transferred from the Army for Sleeping Sickness duty 19.3.27.

El Mulazim Awal Taufik Eff. Minassian, transferred from the Army for Sleeping Sickness duty 1.4.27.

REVIEW OF WORK DURING THE YEAR.

The period covered by this report includes the last quarter of 1926.

The following figures indicate the progress made :—

Admissions by Years.

YEAR.	MONGALLA.			BAHR EL GHAZAL.		
	Yei	Kajo-Kaji	Nimule	Source Yubo	Yambio	West. Dist.
1909	—	—	—	—	—	2
1911	268	—	—	—	—	—
1912	140	—	—	—	—	—
1913	139	—	—	—	—	—
1914	24	—	—	—	—	—
1915	17	187	6	—	—	20
1916	21	197	14	—	—	—
1917	14	95	4	—	—	31
1918	32	42	2	255	—	—
1919	15	63	8	621	—	—
1920	32	54	2	192	—	10
1921	24	31	12	656	—	2
1922	7	68	35	434	—	3
1923	3	5	4	839	4	—
1924	—	82	9	276	14	—
1925	—	10	9	203	6	1
1926	—	3	—	79	—	3
1.10.26. to end 1927 ..	1	—	18	49	3	—
TOTAL ..	737	837	123	3604	27	72

Total Mongalla 1697
Total Bahr El Ghazal 3703

Patients remaining in Camps on 31.12.27 :—

Yei	34
Kajo-Kaji	135
Nimule	41
Ikotos	—
Meridi	—
Source Yubo	1590
West. Dist.	21
TOTAL	1845

These figures show that sleeping sickness is no longer epidemic in the Sudan. The methods by which these results were obtained were outlined in the Annual Report for 1926.

Only 33 cases were found in Tembura district as against 839 in 1923, and out of a total of 3604 in ten years. For the past two years in Tembura district the numbers found have diminished by a half annually.

Yambio district of Bahr el Ghazal still provides a few cases and this will continue until a British Medical Officer can be posted to the district. It is proposed to do so in the autumn, and Meridi district will be supervised from Yambio. This will put the southern Bahr El Ghazal and southern Mongalla on a satisfactory medical basis.

In the Western district of Bahr El Ghazal the infections are nearly all of Congo origin.

In Yei district of Mongalla Province which has produced no cases for five years one case was found in a village that had been clear of the disease for 18 years. This case followed the detection of two women, Congo subjects, found in the district suffering from sleeping sickness. They were repatriated but they are likely to have left infection behind and more cases are to be expected in the district.

In Opari district 18 cases were found, all from one village. This outbreak was the direct result of intercommunication with Uganda. The village has been removed and the infection appears to have died out.

These and other instances serve to show how essential it is to continue inspections and maintain the present staff so long as adjoining countries are infected.

Although it is not possible to reduce the staff, that staff is nevertheless doing incalculable good among the southern tribes.

Except in Yambio and possibly Meridi districts the population is steadily increasing. Syphilis and yaws have been brought under control in many districts and with a British Medical Officer at Yambio, Meridi and Yambio districts should reach the same health standard as the better staffed districts.

As an example of what can be done in a sleeping sickness area by the medical staff employed for sleeping sickness, the results of the treatment of yaws is enlightening.

In 3 sleeping sickness districts of Mongalla Province a campaign against yaws was started in 1926. In that year 6193 cases of active yaws were found and treated. In 1927 only 593 active cases were found.

The people throughout the sleeping sickness areas are under such close administrative control, and so appreciative of medical treatment and understanding of the principles of segregation, that a scheme is under consideration for the eradication of leprosy in those areas.

It is estimated that there are some 2600 lepers in the sleeping sickness districts, and that by modelling segregation of these on the lines adopted for sleeping sickness, all lepers could be self supporting in 2 years, and after that period their treatment and segregation a matter of very small cost.

The sleeping sickness situation is now so favourable that a revision of the regulations governing movement is under review.

The situation can be summed thus :—

1. Sleeping sickness is under complete control in the Sudan.
2. The people throughout the fly areas are closely administered and situated in villages inimical to sleeping sickness. Therefore a serious epidemic is unlikely to occur again ever, provided inspections are regular.
3. The disease could quite easily be stamped out definitely if there were not heavily infected countries along 1000 miles of Sudan frontier.
4. Things being as they are the complete eradication of sleeping sickness from the Sudan is impossible and a close watch has to be kept to detect local outbreaks.
5. If local outbreaks are not detected an epidemic will result.
6. Since a considerable staff has to be employed to detect local outbreaks some relaxation of existing regulations at the present time is permissible, but only because adjoining countries make permanent eradication impossible.
7. The staff, employed primarily for sleeping sickness, is by no means confined in its activities to sleeping sickness, but is able effectively to deal with many diseases, which in other circumstances would take a heavy toll of the population.

(Sgd.) G. K. MAURICE,

Khartoum,

Major, R.A.M.C.,

24th June, 1928.

A/ Principal Medical Officer, S.D.F.

SANITATION.

Excepting in the case of Khartoum where the sanitation is under the charge of a special Medical Officer of Health, the Public Health administration of each province is controlled by the Senior Medical Inspector posted to that province. In the more developed provinces where there are large towns needing elaborate conservancy arrangements and irrigated areas demanding carefully organised anti-malarial and anti-bilharzia measures the Medical Inspector has one or more British sanitary inspectors under him and a staff of Sudanese sanitary and conservancy overseers in charge of anti-mosquito and conservancy staff. In the larger provinces such as the Blue Nile Province where there are three medical inspectors, and the Red Sea Province, Berber Province and Kassala Province where there are in each two medical inspectors, the duties of the Senior Medical Inspector are preponderatingly sanitary although he retains control of the general organisation of medical work. This unity of control is a great convenience and makes for efficiency, as sanitary and medical questions so largely overlap especially in the case of anti-malarial and anti-bilharzial work. Moreover when a medical inspector has had to motor a hundred miles to deal with some sanitary question it is important that he should be in a position to deal with any medical matter that may arise and more particularly so as the two matters are probably inter-dependent.

There is a total of 15 British sanitary inspectors employed in the Sudan. They are distributed as follows :—

Khartoum Province :—

Khartoum town	..	..	..	3	}	6
Khartoum North	..	..	..	1		
Omdurman	..	..	..	1		
Khartoum Rural District	..	..	..	1		

Blue Nile Province :—

Wad Medani town	..	..	..	1	}	3
Irrigated area	..	..	..	1		
Canalisation work	..	..	..	1		

Berber Province :—

Atbara	..	..	..	..	1	}	3
Northern area	..	..	..	..	1		
Southern area	..	..	..	..	1		

Red Sea Province :—

Port Sudan town	..	..	..	..	1	}	2
Port Sudan (Province inspection)	..	..	..	..	1		

Reliefs and special duties 1

A sanitary inspector has to be sent to Kassala Province for a month or six weeks after the Gash flood has subsided.

A sanitary inspector had to be stationed at Makwar from October onwards throughout the winter to supervise anti-malarial and conservancy arrangements for Egyptian labourers who were employed on the Sennar Dam.

The Medical Officer of Health, Khartoum Province also acts as Assistant Director of the Sudan Medical Service and in particular concerns himself with the sanitary administration.

The conservancy workshops at Khartoum are used for making conservancy carts, latrine seats, etc. and repairing sanitary material for provincial centres as well as for Khartoum Province. Wad Medani and Atbara carry out their own workshops for construction and repair and this will soon be the case at Port Sudan.

REPORT

on the

HEALTH AND SANITATION

of

KHARTOUM, KHARTOUM NORTH AND OMDURMAN, 1927.

GENERAL.

In the absence of some system of registration of sickness one is dependent for the consideration of the health of the Province upon information regarding births and deaths and notifications of infectious diseases.

In these respects the year under review has not been marked by any special epidemic with a high mortality, although diphtheria gave rise to some anxiety after the rainy season, but has since died down to a few sporadic cases.

Nor has there been any material alteration in the birth and death rates, the former 1.2, and the latter .41 per mille, lower than the preceding year.

COMMUNICABLE DISEASES.

Locally contracted malaria was kept well within bounds in spite of good rains.

Most of the rain fell between July and September but the showers were sufficiently well spread out to allow of the towns being dried off before any mosquito breed-out could occur.

Towards the end of September and during October it was observed that the culex infections, which usually precede the anopheline infections by some weeks, were not occurring, but that the curve of anopheline infections was steadily rising. This observation, which has been noted in previous years, gave warning of a possible heavy malaria incidence in the near future. This, I regret to say, has actually occurred during the months of January and February 1928. Further consideration of the malarial situation will be found later in this report.

Twice during the year, namely in April and August, we were threatened with small pox, two cases occurred in April at Um Arda near Gebel Aulia and one case at Um Dom in August, but prompt measures of vaccination and isolation prevented any spread.

The notifications of typhoid fever and dysentery do not show any appreciable reduction. Omdurman is responsible for the majority of typhoid in spite of the improved water supply, which has now been available for one year, and I am afraid that in a large native population such as this, where flies abound, carrier cases will be a source of trouble for some time to come; the same remarks apply to both amoebic and bacillary dysentery.

The question of providing a potable water supply to Khartoum North is now under consideration by the authorities concerned and it is to be hoped that this most desirable advancement in the interests of public health will not be delayed.

CONSERVANCY.

The general sanitation of the three towns remains the same. The conservancy system in Khartoum and Khartoum North has worked smoothly although in the former place the number of buckets and clearances steadily increases and the system becomes more and more unwieldy.

Additional carts have been made in our workshops for the purpose of starting a double bucket system in part of Omdurman.

REFUSE COLLECTION.

Refuse collection continues as before with the addition of one Ford lorry with a specially constructed body. It is hoped that this lorry together with two additional ones now on order will speed up the collection and removal of refuse in Khartoum and Omdurman. Additional sweepers are required for the market area of Khartoum.

FOOD SUPPLIES.

Approval has been obtained for the construction of a new abattoir to be made of cement concrete slabs with iron uprights and cross bars but without any roof. The present site and arrangements are unsightly and no water is laid on; the new site selected is to the south of Khartoum and water will be laid on. Transport of meat to the market is still unsatisfactory, although one contractor for the British troops transports his meat in an allmetal Ford lorry.

The fresh food markets in Khartoum remain satisfactory. The new fish market in Khartoum was completed during the year and two of the old fish market mastabas were repaired and are now being used as an extension of the vegetable market. The floor of the offal market was also relaid.

The fresh food markets of Omdurman although greatly improved are still very fly-ridden and the removal of certain offensive trades in the immediate neighbourhood will have to be undertaken shortly.

The new meat market at Khartoum North is very satisfactory though perhaps unfortunately sited on the edge of the main thoroughfare. Additional buildings of the same nature for fish and vegetables are badly needed.

INSANITARY PREMISES.

A further step has been made in closing a number of premises in Khartoum which are unfit for human habitation; the occupiers of these premises go either to Omdurman or to the Deims and the owners of the properties are encouraged to erect a better type of building for the occupation of a better type of tenant. During the year application was made for closing orders for 29 insanitary premises in Khartoum.

In Omdurman considerable progress has been made in dealing with insanitary, undeveloped properties, 38 such premises being dealt with during the period under review.

FILLING IN PITS IN OMDURMAN.

The work of filling in numerous pits in Omdurman has continued throughout the year and has largely reduced the number of potential mosquito breeding places which are a source of danger during the rains.

OMDURMAN WATER SUPPLY.

16 wells in private ownership have been filled in and 803 private connections made for pure water supply in Omdurman.

LEGISLATION.

No legislation in the interest of public health has been introduced during the year.

STAFF.

The following changes in the British sanitary inspector staff have taken place: Mr. Edwards, Sanitary Inspector, was transferred to the Gezireh on 14/9/27. Mr. Taylor, Sanitary Inspector, was appointed on 17/7/27. 1 Native Sanitary Overseer was transferred to Kordofan Province.

POPULATION.

The population of the province is estimated at 204,185, made up as follows :—

District	Men	Women	Children	Total
Khartoum	11,035	9,846	11,084	31,965
Khartoum North	5,557	6,553	7,002	19,112
Omdurman... ..	22,082	27,225	29,931	79,238
Rural District	21,962	28,083	23,825	73,870
Total	60,636	71,707	71,842	204,185

Of the above, the following are non natives of the Sudan :—

	Khartoum	Khartoum North	Omdurman	Rural District	Total
Indians.					
Men	23	—	33	—	56
Women	24	—	15	—	39
Children	56	—	28	—	84
Egyptians.					
Men	861	270	111	—	1,242
Women	809	149	88	—	1,046
Children	1,430	258	272	—	1,960
Europeans and Americans.					
Men	1,016	30	18	5	1,069
Women	834	15	29	3	881
Children	995	10	1	2	1,008
Other Non-Natives.					
Men	1,541	—	334	—	1,875
Women	1,004	—	147	—	1,151
Children	862	—	184	—	1,046
Total	9,455	732	1,260	10	11,457

BIRTHS AND DEATHS.

3,603 births and 2,598 deaths were registered during the year, showing an excess of births over deaths of 1,005.

The appended table shows the relationship of birth and death rates to the population of each locality per 1,000 :—

	Population	Births	Birth Rate	Deaths	Death Rate
Khartoum ..	31,965	580	18.14	442	13.82
Khartoum North ..	19,112	555	29.00	280	14.65
Omdurman ..	79,238	1,430	18.04	1,137	14.34
Rural District ..	73,870	1,038	14.05	739	10.00
Total ..	204,185	3,603	17.64	2,598	12.72

115 still births were also registered in the four localities during the year.

The infantile mortality for the four localities was 84.3 per 1,000 births and in each locality was as follows :—

	Per 1,000 births.
Khartoum	87.9
Khartoum North	46.8
Omdurman	112.6
Rural District	63.6

The infantile mortality for the natives of the Sudan in the four localities was 86.1 per 1,000 births.

In examining the causes of infantile mortality the majority of deaths are attributed to :—

- (1) Diarrhoea
- (2) Fever of unknown origin.
- (3) Pneumonia and bronchitis.
- (4) Debility and prematurity.

These are the causes given by the parent and are not official medical diagnoses.

(5) BIRTHS RECORDED BY MONTHS, LOCALITIES AND SEXES.

Month	Khartoum		Khartoum North		Omdurman		Rural District		TOTAL		Still Births	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
January	21	23	39	26	53	45	38	41	151	135	4	4
February	23	13	31	29	41	39	42	31	137	112	8	3
March	23	24	38	21	54	57	50	42	165	144	1	2
April	28	15	27	27	56	63	27	20	138	125	13	3
May	26	22	32	30	57	60	60	46	175	158	5	6
June	21	14	25	28	62	61	61	46	169	149	1	3
July... ..	28	26	10	13	69	61	26	40	133	140	7	1
August	36	26	12	18	61	61	31	39	140	144	4	8
September	29	23	20	19	78	65	46	50	173	157	8	1
October	25	26	19	23	63	61	42	33	149	143	7	3
November	36	24	13	13	57	63	60	57	166	157	5	7
December	23	25	20	22	65	78	58	52	166	177	6	5
Total	319	261	286	269	716	714	541	497	1862	1741	69	46
	580		555		1,430		1,038		3,603		115	

	Births		Total	Still Births	
	M.	F.		M.	F.
Khartoum	319	261	580	14	13
Khartoum North	286	269	555	11	5
Omdurman	716	714	1430	16	16
Rural District	541	497	1038	28	12
Total	1,862	1,741	3,603	69	46

(6) BIRTHS RECORDED BY NATIONALITIES, LOCALITIES AND SEXES

Nationality.	Khartoum		Khartoum North		Omdurman		Rural District		Total		Still Births	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
British	3	2	—	—	—	—	—	—	3	2	—	—
Greek	11	15	1	1	—	—	—	—	12	16	—	1
Other Europeans	7	6	—	—	—	—	—	—	7	6	—	—
Egyptians & Syrians	75	64	26	23	32	35	—	—	133	122	3	—
Natives of Sudan	219	173	259	244	676	675	541	497	1,695	1,589	66	44
All Others... ..	4	1	—	1	8	4	—	—	12	6	—	1
Total ... {	319	261	286	269	716	714	541	497	1,862	1,741	69	46
	580		555		1,430		1,038		3,603		115	

(7) DEATHS RECORDED BY MONTHS, LOCALITIES AND SEXES.

Month				Khartoum		Khartoum North		Omdurman		Rural District		Total	
				M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
January	...	...	...	10	14	10	11	30	39	13	17	63	81
February	...	...	...	15	11	12	16	24	37	23	19	74	83
March	...	...	...	22	26	5	14	31	36	47	46	105	122
April	...	...	...	16	9	9	13	34	35	33	34	92	91
May	...	...	...	31	20	8	10	53	49	47	52	139	131
June	...	...	...	11	21	7	11	48	43	33	39	99	114
July	...	...	...	23	10	9	9	46	54	29	31	107	104
August	...	...	...	20	23	13	7	64	108	21	23	118	161
September	...	...	...	30	22	13	14	65	74	23	39	131	149
October	...	...	...	23	22	7	25	46	53	16	22	92	122
November	...	...	...	13	15	11	14	35	43	36	35	95	107
December	...	...	...	11	24	18	14	41	49	23	38	93	125
Grand Total ... {				225	217	122	158	517	620	344	395	1,208	1,390
				442		280		1,137		739		2,598	

(8) DEATHS RECORDED BY NATIONALITIES, AGE PERIODS AND SEXES.
Khartoum, Khartoum North and Omdurman.

NATIONALITY.	Under 1 Year	1 to 5	5 to 10	10 to 20	20 to 40	40 to 60	over 60	Total	
								M.	F.
British ...	—	2	—	—	6	1	—	8	1
Greek ...	2	1	2	—	3	5	5	13	5
Other Europeans ...	—	—	—	1	—	1	2	4	—
Egyptians and Syrians...	18	7	3	5	11	9	9	30	32
Natives of Sudan ...	283	493	100	116	350	363	795	1,148	1,352
All others ...	1	1	—	—	1	1	1	5	—
Total ...	304	504	105	122	371	380	812	1,208	1,390
								2,598	

(9) DEATHS RECORDED BY NATIONALITIES, LOCALITIES AND MONTHS IN CHILDREN UNDER FIVE YEARS.

Month	Khartoum					Khartoum North			Omdurman			Rural District	Total
	British	Greek	Egyptians and Syrians	Natives of the Sudan	All others	Greek	Egyptians and Syrians	Natives of the Sudan	Egyptians and Syrians	Natives of the Sudan	Natives of the Sudan		
	0-1: 1-5	0-1: 1-5	0-1: 1-5	0-1: 1-5	0-1: 1-5	0-1: 1-5	0-1: 1-5	0-1: 1-5	0-1: 1-5	0-1: 1-5	0-1: 1-5	0-1: 1-5	
January ...	—	—	—	2	1	—	—	2	—	—	—	4	20
February ...	1	—	—	6	—	—	1	2	—	—	—	8	39
March ...	1	—	1	8	1	—	—	—	—	—	—	22	61
April ...	—	—	1	1	1	—	—	1	—	—	—	11	51
May...	—	—	1	2	4	—	—	2	1	1	—	22	64
June ...	—	—	—	1	3	—	—	1	—	—	—	25	74
July...	—	1	—	3	2	—	—	3	—	—	—	8	60
August ...	—	—	1	4	10	—	—	—	—	2	—	5	122
September ...	—	1	—	5	14	—	2	1	1	1	—	13	121
October ...	—	—	3	3	4	—	1	1	2	—	—	8	68
November ...	—	—	2	2	5	—	1	5	—	—	—	7	67
December ...	—	—	—	2	4	1	—	1	1	—	—	13	60
Total ...	Nil: 2	1 : 1	10 : 2	39 : 49	1 Nil	1 Nil	5 Nil	20 : 55	3 : 5	158: 243	66: 146		807

Total

From one to five years

Under one year

Khartoum	...	51	54	105
Khartoum North	...	26	55	81
Omdurman	...	161	248	409
Rural District	...	66	146	212
Total	...	304	503	807

COMMUNICABLE DISEASES.

The following tables show the total number of communicable diseases notified by hospitals and medical practitioners in the three towns during the year ; the figures for the Rural District are unreliable as they only represent cases notified by the dispensaries at Geili and Gebel Aulia. The more important of these communicable diseases are dealt with separately under their respective headings.

TABLE I.
Showing Number of Cases Notified.

DISEASE	Khartoum Local	Khartoum North Local	Omdurman Local	Total of Local Cases	Rural Dist.	Imported Cases	Relapsed Cases	Grand Total
Chicken Pox ...	131	90	3	224	14	3	—	241
Diphtheria ...	61	6	36	103	2	2	—	107
Small Pox ..	—	—	—	—	3	—	—	3
Ankylostoma ...	3	2	—	5	—	3	—	8
Bilharzia ...	5	33	18	56	16	57	—	129
Dysentery, Amoebic	41	17	153	211	—	7	3	221
Dysentery, Bacillary	35	17	7	59	—	16	9	84
Typhoid Fever ...	6	14	39	59	3	5	—	67
Kala Azar ...	—	—	—	—	—	3	—	3
Leprosy ...	1	—	4	5	—	4	—	9
Malaria ...	39	26	5	70	1,790	24	809	2,693
Black Water Fever...	—	—	—	—	—	2	—	2
Measles ...	67	26	5	98	13	2	—	113
Mumps ...	13	16	2	31	—	—	—	31
Sand Fly Fever ...	164	146	—	310	—	—	—	310
Puerperal Fever ...	1	—	13	14	—	—	—	14
Scabies ...	3	—	—	3	—	—	—	3
Soft Sore ...	55	28	4	87	2	6	72	167
Syphilis ...	274	405	181	860	33	—	532	1,425
Tuberculosis, Pulm...	15	7	29	51	—	15	—	66
Whooping Cough ...	54	31	1	86	2	—	—	88

(11) COMMUNICABLE DISEASES.

TABLE II.

Showing cases Notified by Month and Place.

Key:— K.—Khartoum ; KN.—Khartoum North ; O.—Omdurman ; R.D.—Rural District ; I.—Imported ; R.—Relapsed.		Place	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total	Grand Total
Chicken Pox	...	...	K.	9	12	36	33	24	11	5	1	—	—	—	131	241
			KN.	—	72	8	3	2	5	—	—	—	—	—	90	
			O.	1	—	—	—	—	—	—	—	2	—	—	3	
			R.D.	—	6	2	1	2	—	—	—	3	—	—	14	
			I.	1	—	—	—	1	1	—	—	—	—	—	3	
Diphtheria	...	...	K.	2	—	—	—	—	—	2	14	18	10	11	61	107
			KN.	—	—	—	—	—	—	—	—	2	1	2	6	
			O.	1	1	—	2	—	—	—	2	8	4	5	36	
			R.D.	—	—	—	—	—	—	1	1	1	—	—	2	
			I.	—	—	—	—	—	—	—	—	—	2	—	2	
Small Pox	...	...	R.D.	—	—	—	2	—	—	1	—	—	—	—	3	3
Ankylostoma	...	...	K.	—	—	1	—	1	—	—	—	—	1	—	3	8
			KN.	—	—	—	—	1	—	—	—	—	1	—	2	
			I.	2	—	—	1	—	—	—	—	—	—	—	3	
Bilharzia...	...	...	K.	1	—	—	—	—	1	1	1	1	—	—	5	129
			KN.	1	1	—	1	18	2	1	2	2	1	1	33	
			O.	1	1	—	2	1	2	1	6	2	1	1	18	
			R.D.	—	—	13	—	—	—	1	1	—	1	—	16	
			I.	5	9	4	2	—	3	6	17	—	9	1	57	
Amoebic Dysentery	...	...	K.	9	1	2	1	3	1	5	11	3	1	2	41	221
			KN.	1	—	1	—	4	—	—	1	—	3	—	17	
			O.	5	6	6	4	11	15	25	25	19	9	9	153	
			I.	—	—	1	—	2	—	—	—	2	1	1	7	
			R.	—	1	—	—	—	—	1	1	—	—	—	3	

(Contd.)

COMMUNICABLE DISEASES.

TABLE II.—(Continued).

Disease	Place	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total	Grand Total
Bacillary Dysentery	K.	6	4	—	—	3	—	—	8	5	3	4	2	35	84
	KN.	1	1	—	1	1	1	1	2	2	3	2	2	17	
	O.	—	—	—	—	1	—	—	2	—	1	3	—	7	
	I.	1	—	—	1	—	1	—	1	—	6	3	3	16	
	R.	—	—	1	1	—	1	2	1	1	—	1	1	9	
Typhoid Fever.. ..	K.	2	—	—	—	—	—	—	2	—	2	—	—	6	67
	KN.	—	—	1	4	—	1	2	1	4	—	1	—	14	
	O.	4	5	2	1	2	3	7	3	3	6	—	3	39	
	R.D.	—	—	—	—	—	—	1	—	—	2	—	—	3	
	I.	—	—	—	—	—	2	—	—	2	—	—	1	5	
Kala Azar	I.	1	1	—	—	—	—	—	—	—	—	1	—	3	3
Leprosy.. ..	K.	—	—	—	—	—	—	—	—	—	1	—	—	1	9
	O.	—	—	—	1	1	—	—	—	—	1	—	1	4	
	I.	—	—	—	2	—	—	—	—	—	1	—	1	4	
	K.	—	15	4	3	2	2	—	2	—	4	—	7	39	
	KN.	—	5	14	—	—	—	2	—	1	4	—	—	26	
Malaria	O.	—	—	2	—	—	—	1	—	—	—	—	2	5	2,693
	R.D.	289	289	222	666	89	55	37	27	26	31	20	39	1790	
	I.	—	1	1	—	3	—	—	2	7	6	1	3	24	
	R.	49	66	51	26	55	63	48	78	86	108	103	76	809	
	I.	—	—	—	—	—	—	—	—	—	1	—	1	2	
Black Water Fever	I.	—	—	—	—	—	—	—	—	—	—	—	—	—	2
Measles	K.	2	6	10	15	22	8	2	1	1	—	—	—	67	113
	KN.	—	5	14	3	—	—	—	2	2	—	—	—	26	
	O.	—	1	—	2	—	—	1	—	—	—	1	—	5	
	R.D.	—	—	1	—	—	—	4	8	—	—	—	—	13	
	I.	1	1	—	—	—	—	—	—	—	—	—	—	2	

COMMUNICABLE DISEASES.

TABLE II.—(Continued).

Disease.	Place	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total	Grand Total
Mumps	K.	4	1	—	—	—	—	—	5	3	—	—	—	13	31
	K.N.	—	—	2	—	2	—	2	—	3	5	2	—	16	
	O.	—	—	—	1	—	—	—	—	—	1	—	—	2	
Sand Fly Fever	K.	18	17	6	1	7	11	12	10	2	11	44	25	164	310
	K.N.	—	—	4	—	5	13	12	10	44	29	19	10	146	
Scabies .. .	K.	3	—	—	—	—	—	—	—	—	—	—	—	3	3
Soft Sore	K.	13	8	2	3	3	14	6	—	4	—	2	—	55	167
	K.N.	1	1	3	2	2	5	3	—	3	6	2	—	28	
	O.	—	—	—	—	—	—	—	—	—	—	—	4	4	
	R.D.	—	—	—	1	—	—	—	—	—	—	—	1	2	
	I.	2	—	—	—	—	1	—	—	—	—	—	3	6	
	R.	40	27	2	2	—	—	1	—	—	—	—	—	72	
Puerperal Fever	K.	—	—	—	—	—	—	—	—	—	—	—	1	1	14
	O.	—	4	1	2	1	—	—	—	3	—	2	—	13	
Syphilis	K.	14	6	10	17	8	18	71	19	40	20	15	36	274	1,425
	K.N.	3	32	15	33	82	63	—	28	36	1	112	—	405	
	O.	7	15	15	10	18	20	15	13	24	16	8	20	181	
	R.D.	—	—	1	5	2	4	14	2	2	1	—	2	33	
	R.	81	16	8	14	—	12	34	34	19	135	39	140	532	
Pulmonary Tuberculosis	K.	—	1	—	2	1	2	3	2	1	—	—	3	15	66
	K.N.	—	—	—	1	—	—	2	—	—	1	—	3	7	
	O.	3	4	1	6	3	2	4	—	—	3	2	1	29	
	I.	—	—	2	2	1	2	—	1	—	1	3	3	15	
Whooping Cough	K.	—	—	—	—	—	—	—	—	—	14	25	15	54	88
	K.N.	—	—	—	—	—	—	1	—	9	8	10	3	31	
	O.	—	—	—	—	—	—	—	—	—	—	—	1	1	
	R.D.	—	—	—	—	—	—	—	—	—	—	2	—	2	

MALARIA.

New local infections :—

Year	Khartoum	Khartoum North	Omdurman	Total	Imported New Infections	Rain fall
1920	93	—	24	117	112	341.2
1921	156	61	1	218	644	230.1
1922	516	73	482	1071	100	379.8
1923	795	112	669	1576	195	337.5
1924	36	1	14	51	128	157.6
1925	63	3	4	70	183	102.7
1926	11	28	1	40	37	88.6
1927	39	26	5	70	24	215.8

The imported new cases are largely those natives of the Sudan who contracted malaria in the Rural District and came to the hospitals for treatment.

In addition to the above in the years 1926 and 1927 there were 503 and 809 relapsed cases of malaria treated in the hospitals.

In 1927 there were 1790 cases of malaria, either fresh infections or relapsed treated in the Rural District. Very many more cases could have been found and treated had staff been available.

In order to draw any deductions from these figures many factors have to be taken into consideration.

I think that it is a fair assumption that the antimosquito staff working in the three towns and over a short area outside these towns is able to prevent any breed-out in these areas. In years of heavy rainfall as in 1922 and 1923 the staff cannot compete with the flooded areas. This alone can be remedied and has to a large extent been remedied by improved drainage.

Khartoum has a larger European and more susceptible population than either Khartoum North or Omdurman. Khartoum has more irrigation and vegetation than either of the other two towns.

Apart from the local breed-out there are three additional means of entry for mosquitoes into the towns :—

- (1) By trains arriving from infected areas e.g. the Ghezireh.
 - (2) By native boats passing down the river at night after avoiding the quarantine stations.
 - (3) By flight with the north wind from pools formed by the receding river outside the area covered by existing staff.
- No. 1 may be a very potent source of entry. A scheme for spraying trains has been submitted and it is hoped that this will have the desired effect.
- No. 2 is probably a more potent source of entry and it should be possible to strengthen quarantine measures at night by means of a launch and police.
- No. 3 is, I consider, the most potent source of entry especially during the high north winds between December and April.

The distance an anopheline will fly is not accurately known, it depends largely on the readiness with which it can obtain food and deposit its ova, and also on the prevailing wind and its force. There is no doubt that infected adult mosquitoes can reach the three towns readily from the northernmost part of the province, i.e. parts of the province where antimosquito measures are inadequately carried out, e.g. river pools and farms.

The existing staff on the Rural District consists of a British Sanitary Inspector with a motor cycle as transport, two mosquito men, and a Dispensary Hakim at Geili who carries out treatment and local sanitary inspections. This staff and transport are inadequate to ensure that these farms and river pools are free from mosquito breeding and it seems clear that additional mosquito men must be engaged to patrol both banks of the river as far as Geili at least and to make more thorough inspections of farms; this is especially necessary when the river is receding between November and March.

During the months of April, May and June the staff can be given leave in rotation and from July onwards they will all be needed for keeping the three towns clear during rains.

A motor lorry is urgently needed in the Rural District if we are to extend our antimosquito measures for the protection of the three towns. Such a lorry would be used to transport men and materials along both banks of the river to deal with pools and farms.

In connection with antimosquito measures a systematic treatment of native carriers of malaria in villages must be undertaken and it is hoped that the Director Sudan Medical Service will be able to provide a medical officer for this work for six months of the year.

ANTIMOSQUITO MEASURES.

The total expenditure for the year on antimosquito work within the Province was £E. 1406 i.e. £E. 1,210 for labour and £E. 196 for larvicides.

During the year the total infections found were 7,422 of which 5,647 were found in Khartoum District, 1,140 in Khartoum North and 635 in Omdurman. Of the total infections found, 389 were in the pupal stage and 1,223 were eggs.

The pupal infections shew an increase of 270 compared with that of 1926. This increase is due to the exceptionally heavy infections found in the river pools on the Blue Nile above Burri at the latter end of the year, when we decided to extend the limits of our inspections as far as Soba. Similar precautions had to be taken on the Main Nile where we also found the river pools very heavily infected. The infections found both on the Main and Blue Niles were almost entirely of the anopheline species.

The rainfall during the rainy season was 215.8 mms. This is well above the average of recent years but it was so distributed, that once the subsidiary drains were opened we had ample time between each fall to deal with the water. The most trouble was experienced at the south west part of Khartoum City between Melik Avenue and Kitchener Avenue particularly in the area which drains south to the main drain leading to the White Nile. Another part which could not be effectively dealt with was that area of ground adjoining and close to the north and south sides of the railway track running due east from Khartoum Central Station. Both these areas have since been reported on by the Municipal Engineer and I trust the remedial measures suggested by him will be put in hand in the near future.

SUNT FOREST.

Early in the year the Forestry Department did a considerable amount of thinning out amongst the young trees, particularly where we had experienced great difficulty in previous years, and access was thereby made much easier to deal with the various infected areas. Numerous mosquito infections were, as usual, found at this place and a considerable amount of time and labour of the mosquito brigade was spent in dealing with these infections.

DIPHTHERIA.

Up to the end of July sporadic cases of this disease occurred in Khartoum and Omdurman, 8 cases in all being notified. From the middle of August the disease took an epidemic form in Khartoum beginning among natives in the Deims outside the town. By the end of August cases began to occur among all communities in Khartoum and during September and October the disease spread to Omdurman and Khartoum North.

The spread of the infection was undoubtedly due to "Carriers" as no less than 6 persons were found to be carriers up to the end of September and 17 in all to the end of the year. These were all isolated and given suitable treatment.

Early in the course of the epidemic an old man dying of pulmonary tuberculosis was found to be a carrier of virulent diphtheria bacilli, many people were visiting him and nearly all the earlier cases were traced as contacts from this old man. During the earlier weeks cases were brought to hospital for treatment 3 to 4 days after the onset and often in a moribund condition, consequently the death rate at that time was as high as 40 per cent.

An Arabic notice explaining suspicious symptoms and urging the people to seek medical advice early was distributed through the Governor to all Sheikhs of quarters and to schools in the three towns.

It was noticed by the Director, Khartoum Civil Hospital, that when a child patient was fit for discharge the parent who had accompanied it to hospital gave a positive result from throat swabs. This led to prolonged isolation of both child and parent, until later both underwent the same treatment while under supervision.

By the end of the year the outbreak was well controlled, all contacts at home and in the schools were carefully watched and several cases, showing no symptoms but giving positive throat swabs, were isolated and treated.

The total number of cases treated to the end of the year was 107, distributed as follows :—

Khartoum	..	..	..	..	..	61
Khartoum North	..	..	..	..	..	6
Omdurman	..	..	..	..	..	36
Rural District	..	..	..	..	..	2
Imported	..	..	..	..	..	2

It is of interest to note that the outbreak began in the native quarter outside Khartoum about the middle of August, i.e. after the heaviest rains had fallen. In a large part of that quarter, the water had lain for several days at a time.

It must be remembered that there is no conservancy system in the Deim area, the soil around the villages is heavily polluted and the water lying around this area became particularly offensive. Children delight in playing about in pools and it is extremely possible that this was a predisposing cause, although the old man who died of tuberculosis must be held responsible for a number of cases.

Sexes :—

Males	..	..	..	..	..	60
Females	..	..	..	..	..	47

Nationalities :—

British	..	..	..	..	..	6
Other Europeans	..	..	..	..	..	11
Egyptians and Syrians	..	..	..	..	..	16
Natives of Sudan	..	..	..	..	..	74

Deaths :— **23.** Case mortality 21.5 per cent.

Age periods :—

1 - 5	5 - 10	10 - 20	20 - 30	30 - 40	Over 40.
47	36	9	6	4	5

No cases occurred in the Central Prison or among troops of the Sudan Defence Force and only 3 cases among the British troops.

TYPHOID FEVER.

The notifications of this disease show a slight increase over the previous twelve months.

In 1926, 57 cases were notified, 49 of which were locally contracted and the remainder imported; during the past year 59 cases locally contracted and 8 imported; showing an increase of 10 cases.

As in the preceding year the majority of the cases were notified from Omdurman, but in Khartoum North double the number of cases occurred during the year under consideration; in Khartoum the same number of cases were notified in 1926 and 1927. Only three cases occurred in European subjects, all the remainder occurred among an almost entirely uninoculated population.

It has not been possible to trace the origin of any cases but it is highly probable that carriers are responsible for a large number of cases in the three towns.

In spite of a pure water supply for the past year in Omdurman there has been an increased incidence, and I consider that flies and pit latrines in this town are a more probable source than water. Pit latrines must be a minimum of 3 metres and not more than 5 metres deep, depending on the site. In view of the difficulties of introducing a conservancy system into such a large native town or of reducing fly breeding we must expect a continued incidence of this disease in Omdurman but we can reduce the number of carriers by ensuring that cases are not discharged from hospitals until more than one bacteriological examination has proved negative.

With regard to Khartoum North there are no pit latrines and flies are not a particular nuisance but there is no potable water supply. The introduction of pure water supply to this town may be expected to reduce the incidence of this disease but carriers among the natives will need careful watching.

T.A.B. inoculations are carried out among the immediate contacts of cases but no inoculations on a large scale are carried out except among native troops and police. 4 cases were notified post inoculation.

The following tables show the incidence by nationalities and age periods and reference to table II, preceding, shows the incidence by months in the three towns.

This disease is endemic but the incidence is extremely low when it is realised that there is a susceptible population of over 120,000.

The mortality was 17 per cent. of cases notified. This was almost entirely due to natives failing to realise the seriousness of the illness and only bringing cases to hospital when moribund.

Localities :—

Khartoum	..	..	..	..	..	6
Khartoum North	..	..	..	..	..	14
Omdurman	..	..	..	..	..	39
Imported	..	..	..	..	..	8

Sexes attacked :—

Males	..	..	..	..	..	52
Females	..	..	..	..	..	15

Nationalities :—

British	..	..	..	..	..	1
Other Europeans	..	..	..	..	..	2
Egyptians and Syrians	..	..	..	..	..	7
Natives of Sudan	..	..	..	..	..	56
Others	..	..	..	..	..	1

Age Periods :—

1 - 5	5 - 10	10 - 20	20 - 30	30 - 40	Not defined
4	12	23	24	3	1

Deaths :— 10.

In addition to the above 10 cases of typhoid fever were clinically diagnosed for which no bacteriological confirmation could be obtained.

THE DYSENTERIES.

There were 221 cases of amoebic dysentery and 84 cases of bacillary notified during the year, making a total of 305 : these figures both show a slight reduction compared with the figures for the preceding year when the total was 367 of which 279 were amoebic and 88 bacillary.

By far the majority of cases, 69.2 per cent, of amoebic dysentery occur in Omdurman and only 8.3 per cent. of the bacillary dysentery cases were reported from that town. The rainy months of July to October produced the heaviest incidence among the natives of Omdurman. This is the worst period for flies and stagnant water pools in and around the town.

The natives, however, are commonly found to harbour amoebae without ill effect and it is only when some subsidiary cause such as cold or dampness intervenes that active symptoms arise and they seek hospital treatment.

It will be seen from the tables below that the incidence of bacillary dysentery was heaviest in Khartoum. 29 of the cases occurred in British subjects or 83 per cent. of the total cases for the town. The susceptibility of Europeans to this type of illness in tropical countries is well recognised and it is only by paying especially attention to their kitchen arrangements and preparation of uncooked foods that attacks of dysentery can be avoided. Fortunately for us the milder forms of this disease are commonest in Khartoum, i.e. the Hiss and Russell variety and a mild Flexner form, although the Shiga variety is by no means uncommon.

August and September *i.e.* rainy months show the highest incidence although a very large part of the European population are on leave: January and February show the next highest incidence when the European population is at its maximum and the coldest weather is experienced.

AMOEBIIC DYSENTERY :—

				1927	1926
Locally contracted	..	..		211	215
Relapsed	..	..	..	3	39
Imported	..	..	..	7	25
TOTAL	..	..	..	221	279

Sexes :— Males 103, Females 22, Undefined 96.

Nationalities :—

				1927	1926
British	..	..	..	10	13
Egyptians and Syrians	..	..		4	11
Natives of Sudan	..	..		111	198
Undefined	..	..	..	96	52

Age periods :—

1 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	Over 60	Undefined.
11	19	50	17	13	3	5	103

Central Prison cases :— 2.

BACILLARY DYSENTERY.

				1927	1926
Locally contracted	..	..		59	68
Relapsed	..	..	..	9	8
Imported	..	..	..	16	12
TOTAL	..	..		84	88

Nationalities.

British	..	..	..	29	31
Other Europeans	..	..	..	6	5
Egyptians and Syrians	..	..		5	6
Natives of Sudan	..	..		44	46

Sexes :— Males 62, Females 22.

Age Periods.

1 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	Undefined.
11	12	33	14	6	2	6

Type of Organism :—

Shiga	..	..	..	..	..	20
Flexner	..	..	..	..	..	12
Hiss and Russell	..	..	..	..	..	26
Not defined	..	..	..	..	..	26

Central Prison Cases :— 12

FLY PREVENTION.

Special attention has again been given to the clearance of stable manure in Khartoum and I am convinced that this has, in great measure, been responsible for the large diminution in the number of flies. The provision of proper metal dustbins with tight fitting covers for all premises in Khartoum has lately taken up a good deal of our attention, and I am glad to report that our request for such has, on the whole, been favourably received by both the native and European population.

The number of permits issued in Khartoum and Khartoum North for the making of zibla was 2,942. 10 prosecutions took place for contraventions during the year.

A start has been made with the issuing of zibla permits in Omdurman, and although it is at present only applicable to a limited area I am sure a great reduction in fly breeding will result.

PULMONARY TUBERCULOSIS.

It is satisfactory to report a reduction in the total incidence of this disease during the year, *i.e.* from 80 to 66 but this reduction is only found in Khartoum and Khartoum North where living conditions are generally better and where the native population is smaller than in Omdurman. There is also a marked reduction in the number of cases coming for treatment from outside the three towns. In Omdurman the incidence increased from 15 to 29, nearly 100 per cent. over the preceding year. The spread of this disease among a very susceptible native population will continue until it is found possible to segregate the notified cases. At present they are admitted to hospitals and treated until they leave of their own accord on seeing little or no improvement. On leaving hospital they are given printed instructions pointing out the danger to their friends and relations and are supplied with disinfectant and encouraged to live in open shelters or in a separate room, but no district or home visiting can be undertaken to ensure instructions are carried out.

In following up the cases at the end of the year it was found that 29 had died, 12 were still alive in the district, 9 were still in hospital and 16 had left the district.

Case mortality 43.9 per cent. compared to 50 per cent. in the preceding year.

Sexes :—Males 51, Females 15.

Nationalities :—

British	3
Egyptians and Syrians	2
Natives of the Sudan	61

Age Periods :—

1 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	Over 60	Not defined.
1	9	25	19	5	3	2	2

Of the 15 cases which were contracted outside the Province, 13 were contracted in the following localities :—

Dongola Province	2
Kassala Province	1
Berber Province	3
Blue Nile Province	5
White Nile Province	1
Upper Nile Province	1

3 cases occurred amongst British troops, 5 amongst Sudan Defence Force troops and 5 in Central Prison.

LEPROSY.

Nine new cases were notified during the year, 4 from Omdurman, 1 from Khartoum and 2 imported cases.

In addition to the above there are 34 cases under treatment either as out-patients or in the leper hospital ; these numbers do not include those lepers who are sent to the special hospital from outside provinces but are those who were first diagnosed and notified from the Church Missionary Hospital in Omdurman. Among these cases there are 8 juvenile cases, *i.e.* under 20 years of age, six being in the primary stage and two in the secondary stage.

Whenever new cases occur the relatives occupying the same house are sent to hospital for examination to ensure early diagnosis of any contact cases.

Moogrol is the drug which has been used in their treatment hitherto, but during the year a supply of *Hydnocarpus Anthelmintica* seeds were obtained and given a trial but the form of treatment was very distasteful to the patients. A new drug “Alepol” recommended by the British Empire Leprosy Association has now been obtained and is being used.

OTHER COMMUNICABLE DISEASES.

Sand Fly Fever. continues to attack large numbers of the British troops, but much progress has been made during the year in putting more ground around the barracks under grass. The sand fly seems to thrive where new building operations are in progress, especially on lime and plaster and for the past two years new buildings in both barracks have been continually under construction.

Whooping Cough. was prevalent in Khartoum and Khartoum North during October, November and December and **Chicken Pox** and **Measles** had their seasonal prevalence from February to June.

As a precautionary measure against **Rabies** the Veterinary Service continued the campaign against uncontrolled dogs in and around the three towns, destroying 1,074 dogs during the year.

VACCINATION. .

More than double the number of vaccinations were done in the province during the year ; this was largely due to the cases of small pox found in April and August in which months over four thousand additional persons were vaccinated.

Several cases of generalised vaccinia following vaccination were noted in Omdurman, these may have been due to the virulence of the vaccine.

The following table shows the number of vaccinations done and the results obtained :—

	Successful	Failed	Unknown	Total
Khartoum Civil Hospital ..	2,194	350	49	2,593
British Military Hospital ..	17	4	—	21
S.D.F. Hospital	62	144	—	206
Khartoum North Dispensary ..	1,098	6	939	2043
Omdurman Civil Hospital ..	3,273	66	85	3424
Geili Dispensary	97	32	2	131
Gebel Aulia Dispensary ..	235	44	50	329
Rural District	—	—	7,459	7,459
TOTAL	6,976	646	8,584	16,206

CONSERVANCY.

Very little trouble was experienced with the conservancy work and there was no scarcity of labour. The savings bank is certainly an attraction and, in no small way, helps us to get a good class of man for this work.

The average total number of daily clearances in the three towns is as follows :—

Khartoum	..	..	..	..	..	3,367
Khartoum North	..	..	..	..	..	1,492
Omdurman	..	..	..	..	..	380

The conservancy road from the south-west part of the town to the west loading station is in a deplorable condition and requires relaying in its entire length.

With the extension of the roadway of Mohammed Ali Avenue the work on which is now being carried out, we will be able, in the near future, to remove the existing conservancy loading station at the south east part of the town to the new site at the south of this street.

Sewage Trenching Ground. Additional land is urgently required at the Khartoum trenching ground as the proper rotation cannot now be given. Negotiations for expropriating additional 60 feddans are now in progress.

Extension of Double Bucket System. Owing to the rapid development of the Deims in Khartoum it is gradually becoming more difficult to keep this as clean as it should be and I would now like to bring up the question of introducing a conservancy scheme to replace gradually the present primitive system.

I suggest that a number of public latrines be erected on selected sites on the main streets within the villages with a conservancy light railway running to and connecting up with our present light railway.

I also consider the time has arrived for the provision of one or two public latrines at Hillet Coubar, Khartoum North. This area is becoming more thickly populated.

The question of the introduction of the double bucket system for Omdurman has been under consideration for some time, and with the completion of the new Khartoum-Omdurman bridge, many of the former difficulties have disappeared and a start with the first portion of the scheme is now about to be made by introducing it to the better class localities of that town. For this purpose three conservancy lorries, washing tanks, etc. have been made in the headquarters workshops. The present single bucket conservancy system is run on very modified lines there being only 380 buckets in use which accommodate only 10 per cent. of the population. The other 90 per cent. use principally pit latrines which are most insanitary and create a continual source of danger. By the gradual augmentation of the double bucket system and by introducing public latrines into the poorer localities and private latrines elsewhere, it will be possible to abolish these insanitary pit latrines.

SCAVENGING AND REFUSE DISPOSAL.

There has been a general all round improvement in the cleanliness of the three towns, but before better results can be expected additional sweepers are required, particularly for Khartoum and Omdurman.

The four-wheeled all iron type of refuse cart still continues to work satisfactorily.

Towards the end of the year a new motorrefuse van was brought into use as an experiment. This cart has been employed, mainly, on clearing the large accumulations of rubbish at the various markets and other public refuse bins, together with the leaves and prunings in various parts of the town from trees, which were originally burned, also waste paper etc. from Government and Commercial offices. On this class of work this vehicle has proved very satisfactory and has released the other carts for more efficient house-to-house collection.

The disposal of garden refuse in Khartoum is yearly becoming a more difficult problem. This class of refuse which is at present being mostly burned on the premises, and with the ever increasing amount, the smoke nuisance, risk of fire, and the accumulations of ashes to which is often added household and stable refuse make it most desirable that this rubbish should be dealt with elsewhere, but with the present establishment it is impossible for this Service to undertake its removal.

All incinerators have been repaired and a new one built at the Khartoum Deims.

During the year 47 iron conical-shaped public refuse bins were made and distributed in the three towns.

WORKSHOPS.

Blacksmiths' Workshops : The amount of new work or existing stock extensively renewed is as follows :—

Conservancy lorries	..	..	..	..	8
Refuse trollies	..	..	..	..	6
Axles for lorries	..	..	..	..	21
Buckets (Rebuilt)	..	..	..	..	500
Public Refuse bins	..	..	..	..	47

The total number of general repairs carried out was 5,735, while the general repairs to buckets was 15,485. 176 new hub bushes were cast for wheels of refuse carts and conservancy lorries.

Carpenters' Workshops. 8 new refuse box carts were made in the carpenters workshops, while 772 general repairs were carried out.

Saddlers' Workshops. 16 sets of camel harness, and 15 sets of mule harness were made, while 4,200 repairs were carried out.

The valuable work carried out in these workshops under the supervision of the Chief Sanitary Inspector is a great saving financially to the municipal funds and if it were not for the exceptional technical skill of Mr. Boyle a specially appointed engineer would become a necessity.

MINERAL WATER FACTORIES.

There are 5 mineral water factories in Khartoum, 2 in Omdurman and 1 one in Khartoum North. These factories have been periodically inspected and apart from minor details, have been conducted in a satisfactory manner.

BAKERIES.

The European bakeries in the three towns number 34 *i.e.* Khartoum 25, Khartoum North 2, Omdurman 7, and the native bakeries are 65 : 15, 6 and 44 respectively. The European bakeries on the whole are in a satisfactory condition, and the native premises are regularly inspected, and an endeavour made to raise the standard of this class of business.

RESTAURANTS, NATIVE EATING HOUSES AND COFFEE SHOPS.

A special effort has been, and is still being made, for the general improvement of these premises from a sanitary point of view, and with close co-operation between this Service, the licencing authorities and the persons concerned, much has been done during the past year. Before a licence is granted or renewed for the year the premises must conform to our requirements, and this I am glad to say has been favourably received by the occupiers themselves and in a good many instances they voluntarily made further improvements to those asked for.

MARKETS.

The markets at the Khartoum Deims are of very primitive construction, and it is therefore impossible to keep them in a proper sanitary condition. Owing to the rapidly increasing population at these villages it is highly desirable that a start be made in the near future with the erection of properly constructed markets. The present market site being low lying, is unsuitable, and this should be taken into consideration when the matter is receiving attention.

Omdurman Markets. Since the meat market was wired in the early part of the year under review a noticeable improvement has been effected. The other markets are maintained in a fair sanitary condition taking into consideration the structures and variety of trades.

UNSOUND FOOD.

The unsound food destroyed in the three towns by this Service during the year was 5,214 lbs.

MILK SUPPLY.

The number of registered milk vendors in the three towns is as follows :—

Khartoum	..	..	..	..	..	175
Khartoum North	..	..	..	..	..	58
Omdurman	..	..	..	..	..	94

It will be noted from the above that a start has been made with the registration of milk vendors and their vessels in Omdurman. This registration and weekly inspection, although not guaranteeing a pure milk supply, certainly helps us to keep up a moderate standard of cleanliness.

The Belgravia (Government) Dairy continues to be run on hygienic lines and a pure milk supply can be guaranteed from this place.

The number of milk samples taken during the year was as follows :—

Khartoum	..	..	..	..	..	132
Khartoum North	..	..	..	..	..	60
Omdurman	..	..	..	..	..	72

264

Of the samples taken in Khartoum 41 or 31 per cent. were below standard and the average presumed extent of adulteration was 7.26 per cent. added water. The Khartoum North figures are 8 or 13.3 per cent. and 12.39 per cent. respectively, while those of Omdurman are 12 or 16.66 per cent. and 10.12 per cent.

Proceedings were instituted in 53 cases of adulteration, the other 8 being only slightly below standard it was considered that a warning would suffice.

The percentage of adulterated samples on the whole shews an increase particularly in Khartoum where it was 20 per cent. in 1926 and now shews a further increase of 11 per cent. this year. Higher fines were inflicted during the latter part of the year and it is hoped that this will have a beneficial effect.

The nature and number of milk samples taken in 1927 is as follows :—

KHARTOUM.

Nature of milk				No. of samples taken.	No. of samples adulterated.
Goats	..	..	..	90	29 or 32.22 %
Sheep	..	..	..	1	Nil
Cows	..	..	..	9	2 or 22.22 %
Mixed	..	..	..	32	10 or 31.25 %
TOTALS				132	41

KHARTOUM NORTH.

Goats	..	..	..	48	7 or 14.58 %
Sheep	..	..	..	1	Nil
Cows	..	..	..	1	Nil
Mixed	..	..	..	10	1 or 10 %
TOTALS				60	8

OMDURMAN.

Goats	..	..	..	22	4 or 18.1 %
Sheep	..	..	..	3	1 or 33.3 %
Cows	..	..	..	18	2 or 11.1 %
Mixed	..	..	..	29	5 or 17.2 %
TOTALS				72	12

At the end of the year there were 5 persons registered to sell curdled milk. There are now only 3.

NUISANCES.

The tabular statements appended give in detail the nuisances dealt with in Khartoum and Khartoum North. Up to the present no complete record of nuisances has been kept in Omdurman but approximately 2,000 were abated. From the beginning of 1928 a record is being kept.

PROSECUTIONS.

The total number of prosecutions was 1,008 and the fines amounted to £E. 191.870 m/ms. Details are given in the accompanying tables.

OFFENSIVE TRADES.

As a new site for offensive trades for Khartoum District has been selected to the south west of the town it is to be hoped that the various trades coming under

this category at present within the town boundaries will be moved to this area. It will also be possible to get a start made with the new slaughtering place which will now be laid out on this new site.

RURAL DISTRICT.

The farms to the north of Khartoum received attention during the greater part of the year, but with the falling Nile this was suspended and the energies of the British Sanitary Inspector and two mosquito men were directed on river pools which were, as previously stated, very heavily infected.

The dispensary at Geili continues to do useful work locally, but does not attract people for any distance outside the town. This is only partly due to the lack of personality of the Dispensary Hakim the people themselves are slow in seeking medical aid even when a Syrian medical officer tours among them.

The appended tables relating to mosquito infections found and dealt with, nuisances abated etc. provide ample evidence of the activities of the staff of this Service during the year.

I have lastly to thank the British and native staff for their unceasing energies and also the District Commissioners of the three towns for their wholehearted support in our endeavours to improve the conditions of public health.

(Sgd.) J. C. N. HARRIS

M.D., D.P.H.,

Medical Officer of Health,

Khartoum Province.

**METEOROLOGICAL OBSERVATIONS AT GORDON COLLEGE STATION
FOR THE YEAR 1927.**

Month	Temperature in Farenheit				Relative Humidity in %	Rain m/m.
	Highest Maximum	Lowest Minimum	Average Maximum	Average Minimum		
January	99.0	55.0	90.5	62.4	35	Nil
February	103.9	48.2	88.2	59.9	17	„
March	107.6	52.5	97.0	65.6	15	„
April	111.4	60.8	100.8	69.5	9	„
May	114.4	63.5	105.6	77.7	16	4.7
June	113.7	74.2	107.5	80.5	31	1.1
July	111.0	70.0	99.2	76.7	55	98.1
August	105.8	66.4	98.6	76.7	59	87.2
September	104.9	66.6	100.6	75.6	53	21.2
October	107.6	74.5	104.5	78.1	33	3.5
November	104.4	63.1	95.2	69.1	33	Nil
December	99.2	59.9	93.2	66.2	34	„
Total ...						215.8

I am indebted to Mr. R. Cottam, the Meteorological Observer for the above table, which he kindly supplied.

STATEMENT OF BUILDING PERMITS APPROVED UNDER THE TOWN BUILDING REGULATIONS, 1925.
 During the Year 1927.

	KHARTOUM CITY.				KHARTOUM NORTH			OMDURMAN		
	1st Class Land	2nd Class Land	3rd Class Land	Total in Khtm.	2nd Class Land	3rd Class Land	Total in Khtm. North	2nd Class Land	3rd Class Land	Total in Omdurman
No. of petitions for new buildings ..	13	73	4	90	8	8	16	6	2	8
No. of building permits for minor alterations	7	54	—	61	—	—	—	—	—	—
Total ..	20	127	4	151	8	8	16	6	2	8
Estimated cost of new buildings £E.	4240	13067	170	17477	2383	487	2870	452	1360	1812
No. of notices issued for dilapidated Buildings	5	21	—	26	1	2	3	—	—	—
No. of contravention notices ..	6	49	12	67	2	2	4	—	—	—
No. of notices issued for removal of obstructions from public streets	4	55	—	59	—	—	—	—	—	—
Total no. of notices issued ..	15	125	12	152	3	4	7	—	—	—

NOTE :— Government buildings are not included in above statement.

KHARTOUM.

Mosquito Statement for Year Ending 31st December 1927.

MONTH 1927.	Infections found inside municipal boundary.												No. of permanent collections.	Percentage of permanent collections infected.	Last year's percentage.	Infections found outside municipal boundary.																
	No. of wells, pits, etc., infected		No. of zeers and other small receptacles infected			No. of steamers and boats infected.			No. of pools infected			Total infections.				Burri.						Blue Nile above Burri.			Omdurman and Main Nile.			Total Infections				
	C.	S.	A.	C.	S.	A.	C.	S.	A.	C.	S.	A.				C.	S.	A.	C.	S.	A.	C.	S.	A.	C.	S.	A.	C.	S.	A.	C.	S.
January	3	—	—	7	—	1	1	—	—	17	—	76	28	—	77	1.25	4.26	—	—	—	85	—	163	83	—	16	—	168	—	179	—	
February	2	—	—	8	—	7	—	—	—	3	—	65	13	—	72	.83	3.86	—	—	—	3	—	117	68	—	23	—	71	—	140	—	
March	1	—	—	13	—	2	3	—	—	19	—	52	36	—	54	.41	4.28	2	—	—	12	—	45	56	—	6	—	70	—	51	—	
April	1	—	—	25	—	—	3	—	—	4	—	30	33	—	30	.41	1.55	—	—	—	9	—	55	57	—	8	—	66	—	63	—	
May	3	—	—	17	—	6	6	—	—	30	—	9	56	—	15	1.26	2.73	1	—	—	15	—	118	136	—	23	—	152	—	141	—	
June	—	—	—	25	—	1	33	—	—	9	—	5	67	—	6	—	4.70	—	—	—	—	—	5	70	—	4	—	70	—	9	—	
July	11	—	—	228	6	2	8	—	—	121	—	1	368	6	3	4.62	4.70	6	—	1	2	—	—	164	—	4	—	172	—	5	—	
August	5	—	—	191	—	20	7	—	1	99	—	10	302	—	31	2.13	4.74	3	—	1	—	—	—	171	—	79	—	174	—	80	—	
September	6	—	2	141	—	34	20	—	—	110	1	132	277	1	168	3.40	2.37	7	—	2	6	—	1	183	—	63	—	196	—	66	—	
October	10	—	2	223	—	62	6	—	2	208	2	172	447	2	238	5.12	2.38	2	—	—	1	—	27	175	—	35	—	178	—	62	—	
November	2	—	1	45	—	7	7	—	—	28	—	109	82	—	117	1.28	2.78	—	—	—	58	—	240	105	—	13	—	163	—	253	—	
December	3	—	—	23	—	24	1	—	—	19	—	64	46	—	38	1.28	.80	—	—	—	146	—	626	170	—	48	—	316	—	674	—	
GRAND TOTALS.	47	—	5	946	6	166	95	—	3	667	3	725	1,755	9	899	1.83	3.26	21	—	4	337	—	1.39	1,438	—	322	—	1,796	—	1,723	—	

C. = Culex.

S = Stegomyia.

A. = Anophele.

KHARTOUM.

Nuisances Dealt with During Year Ending 31st December 1927.

MONTH 1927.	Defective latrines.		Latrines not on external walls		Dirty latrines.		Want of or insufficient latrine accommodation.		Insanitary premises.		Defective wells.		Unnecessary wells.		Objectionable waste water disposal.		Accumulation of water.		General.		TOTAL.		GRAND TOTAL.
	B S.	N S.	B S.	N S.	B S.	N S.	B S.	N S.	B S.	N S.	B S.	N S.	B S.	N S.	B S.	N S.	B S.	N S.	B S.	N S.	B S.	N S.	
January ...	7	44	—	—	—	15	—	2	3	82	—	23	—	—	4	13	—	—	12	65	26	244	270
February ...	5	50	—	—	—	28	4	1	—	83	—	2	—	—	—	7	2	—	33	84	44	255	299
March ...	2	39	—	—	2	7	1	1	7	24	—	1	—	—	1	5	—	—	9	67	22	144	166
April ...	6	45	—	—	5	4	—	1	18	58	3	—	—	—	4	2	—	—	10	42	46	152	198
May ...	5	55	—	—	12	2	—	1	9	35	—	—	—	—	3	5	2	—	8	47	39	145	184
June ...	1	31	—	1	7	—	—	—	11	2	—	—	—	—	1	3	1	—	7	19	28	56	84
July ...	1	18	—	—	3	2	—	—	3	13	3	—	—	—	4	5	—	—	18	12	32	50	82
August ...	1	19	—	—	2	7	—	1	2	13	—	—	—	1	—	6	—	4	20	13	25	64	89
September ...	—	27	—	—	—	4	—	—	1	35	1	1	—	—	—	10	—	—	27	33	29	110	139
October ...	2	28	—	—	2	2	—	—	6	6	—	1	—	—	5	19	—	—	3	17	18	73	91
November ...	16	34	—	—	28	18	—	—	25	55	—	—	—	1	20	12	—	—	60	649	149	783	932
December ...	2	22	—	—	1	8	—	—	4	21	—	—	—	—	—	10	—	—	13	440	20	501	521
TOTALS.	48	412	—	1	62	97	5	7	89	427	7	42	—	2	42	97	5	4	220	1,488	478	2,577	3,055

B S. = British staff,

N S. = Native staff.

Note :— The above Figures do not include verbal notices.

KHARTOUM.

Quarantine Stations — Mosquito Statement for Year Ending 31st December 1927.

MONTH.		White Nile Quarantine Station.										Blue Nile Quarantine Station.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
		No. of vessels inspected.			No. of mosquito infections found.			No. of vessels and holds fumigated.			Undeveloped mosquito infections.			No. of vessels inspected.			No. of mosquito infections found.			No. of vessels and holds fumigated.			Undeveloped mosquito infections.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
		Steamers.	Barges.	Native boats.	Few.	Many.	Adult.	C.	S.	A.	Total No. of holds.	Steamers.	Barges.	Total No. of holds.	Steamers.	Barges.	Native boats.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
January	...	...	21	55	142	—	—	19	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

C. = Culex.

S. = Stegomyia.

A. = Anopheline.

KHARTOUM NORTH.

Mosquito Statement for Year Ending 31st December 1927.

MONTH.	Infections found inside municipal boundary.												Infections found outside municipal boundary.												Last year's percentage.	Percentage of permanent collections infected.	No. of permanent collections.	Percentage of permanent collections infected.	Last year's percentage.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
	No. of wells infected.			No. of pits, zeers, or other receptacles.			No. of steamers and boats infected.			No. of pools infected.			Total infections.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
	C.	S.	A.	C.	S.	A.	C.	S.	A.	C.	S.	A.	C.	S.	A.	C.	S.	A.	C.	S.	A.	C.	S.	A.						C.	S.	A.	C.	S.	A.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
January	6	—	—	7	—	—	—	—	—	3	—	2	16	—	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—</

KHARTOUM NORTH.

Nuisances Dealt with During Year Ending 31st Dec. 1927.

MONTH.	Defective latrines		Latrines not on external walls		Dirty latrines		Want of or insufficient latrine accommodation		Insanitary premises		Defective wells		unnecessary wells		Objectionable waste water disposal		Accumulation of water-		General		TOTAL		Grand Total
	B. S.	N. S.	B. S.	N. S.	B. S.	N. S.	B. S.	N. S.	B. S.	N. S.	B. S.	N. S.	B. S.	N. S.	B. S.	N. S.	B. S.	N. S.	B. S.	N. S.	B. S.	N. S.	
January	2	24	—	—	2	—	—	—	10	11	2	10	—	—	4	—	3	—	9	2	37	47	84
February	—	8	—	—	6	—	1	—	20	2	3	10	1	—	4	—	5	—	4	1	44	21	65
March	—	7	—	—	3	—	—	—	20	37	1	4	—	—	2	—	21	—	3	1	50	49	99
April	2	14	—	—	7	1	2	—	18	7	—	6	—	—	9	1	10	—	9	2	57	31	88
May	2	26	—	—	9	6	—	—	42	23	5	10	1	—	17	—	14	—	8	6	98	71	169
June	4	9	—	—	10	—	—	—	41	11	2	2	—	—	17	3	5	—	15	—	94	25	119
July	9	9	—	—	6	1	1	—	103	8	9	3	—	—	11	1	14	—	11	3	164	25	189
August....	2	16	—	—	7	1	—	—	28	9	3	8	—	—	9	4	38	—	17	3	104	41	145
September	3	3	—	—	11	—	—	—	29	5	2	5	—	—	10	1	9	—	21	1	85	15	100
October	3	16	—	—	10	—	5	—	32	7	2	5	—	—	4	1	5	—	10	4	71	33	104
November	—	26	—	—	10	2	—	—	25	13	1	3	—	—	2	—	8	—	7	3	53	47	100
December	3	28	—	—	7	—	1	—	76	7	2	6	—	—	2	1	8	—	6	2	105	44	149
TOTALS	30	186	—	—	93	11	10	—	444	140	32	72	2	—	91	12	140	—	120	28	962	449	1,411

KHARTOUM and KHARTOUM NORTH.

List of Prosecutions for Year Ending 31st December 1927.

MONTH 1927.	Insanitary condition of premises		Unsound and adulterat- ed food		Obstructing inspector		Offences by merchants in suk		Breeding mosquitoes		Defective and insanitary latrines		Causing nuisance on public street		Not calling at mosquito quarantine station		Stagnant water		Other offences		TOTAL Prosecu- tions		FINES					
	K.	K. N.	K.	K. N.	K.	K. N.	K.	K. N.	K.	K. N.	K.	K. N.	K.	K. N.	K.	K. N.	K.	K. N.	K.	K. N.	K.	K. N.	Khartoum	Khartoum N.	£E.	m/ms.	£E.	m/ms.
January ...	4	1	4	—	—	—	1	—	2	2	3	1	—	—	—	—	—	—	3	3	17	7	6	500	2	200		
February ...	10	1	3	2	—	—	—	2	1	2	6	1	2	2	—	—	1	—	6	1	28	11	9	350	1	400		
March ...	5	—	5	—	—	—	1	—	1	2	6	—	1	—	—	—	—	—	12	5	31	7	7	050	1	100		
April ...	7	—	—	—	—	—	—	—	—	6	1	—	—	—	—	—	—	—	3	1	12	7	6	200	—	900		
May ...	73	3	2	4	—	—	36	—	—	2	3	—	2	—	—	—	—	—	32	2	148	11	15	150	1	500		
June ...	35	1	7	1	—	—	—	—	6	—	5	—	—	—	—	—	—	—	20	1	73	3	11	590	—	850		
July ...	15	1	4	—	—	—	—	2	4	1	3	3	—	—	—	—	—	—	18	1	44	8	7	020	1	450		
August ...	2	—	—	—	—	—	—	4	1	1	1	—	—	—	—	—	—	—	14	2	18	7	1	900	1	650		
September ...	3	4	3	1	—	—	3	—	—	2	2	—	—	6	—	—	—	—	6	—	23	7	5	300	1	350		
October ...	4	6	2	—	—	—	4	—	2	3	—	—	3	—	—	—	—	—	59	—	74	9	7	100	2	900		
November ...	5	7	3	—	—	—	—	1	4	3	3	1	—	—	—	—	—	—	22	2	37	14	8	800	3	260		
December ...	4	1	6	2	—	—	9	—	3	3	5	—	5	—	—	—	1	—	48	18	81	24	23	000	3	050		
TOTALS ...	167	25	39	10	—	—	54	9	24	27	38	6	19	2	—	—	2	—	243	36	586	115	108	960	21	610		

K.— KHARTOUM.
 K.N.— " NORTH.

List of Prosecutions undertaken by the Sanitary Service, Omdurman, during 1927.

MONTH	Protection of food supplies Sec. 17 & 18, The Schedule, P.H.O.-1924	Mosquito infection	Unsound and adulterated food	Digging pits	Unlicenced food distributors	Depositing refuse in street or on public land	Dirty workshops or other premises	Failing to produce milk receptacles for inspection	Other offences	TOTAL	FINE £E .m/ms.
January	13	—	—	10	—	—	—	—	—	23	2.950
February	14	—	—	3	2	—	—	—	—	19	3.350
March	35	—	1	1	—	4	—	—	—	41	5.550
April	20	—	—	—	—	1	2	—	—	23	4.600
May	3	2	3	4	2	3	—	32	—	49	5.100
June	9	1	2	2	1	—	—	—	1	16	6.250
July	14	—	—	10	—	—	2	—	—	26	6.250
August	15	5	—	5	2	—	2	—	—	29	5.600
September	7	2	—	—	—	2	—	—	1	12	2.250
October	5	—	2	—	—	—	—	27	—	34	4.800
November	8	1	—	—	1	6	—	—	—	16	6.300
December	9	6	—	1	—	2	1	—	—	19	8.300
Totals	152	17	8	36	8	18	7	59	2	307	61.300

Health and sanitation of the irrigated area.

In the year 1926 malaria had become epidemic in immigrant cotton pickers during January and February and the epidemic had extended to the local inhabitants in April and May. This out-break was attributed chiefly to the incomplete drying off of the field irrigation channels and to a less extent to seepage from the canals. No similar outbreak occurred during this period in 1927.

A general outbreak of malaria occurred throughout the province in the autumn of 1927 following the heavy rains and lasted to the end of the year.

The malarial incidence was heavier in the irrigated area than in the rest of the province. The relative incidence is indicated by the following figures :—

	1926	1927
No. of cases treated in 20 dispensaries in irrigated area September-December ..	357	2,160
No. of cases treated in 3 dispensaries outside irrigated area	336	1,457

This was the first year since the 300,000 feddan area had been brought under cultivation that good rains had fallen.

The following description of the resulting state of affairs is extracted from the Medical Inspector's report :—

“ During the first fortnight of September after the crops had been sown and watered there were heavy rainfalls and their effect on irrigated land was well demonstrated. One watering of the crops is equivalent to 3" of rain and when rain occurs in an area that has been lately watered it cannot be absorbed. Consequently extensive areas were under water and to save the young crops from drowning the surface water had to be drained off. This was done by emptying the canal into natural depressions (ugads) and draining the surface water into the field channels and thence into the canals. The ugads were thus filled and did not dry off in many cases until the second week of October. In these swamps grass soon sprang up and mosquitoes bred out in myriads. The control of mosquito breeding was very difficult owing to the dense grass. An attempt was made to pump up one of these swamps into the main canal, but the experiment was only partly successful owing to the numerous pot holes. In a normal year the risk of malaria infection from them is not great as they dry up fairly quickly. In a heavy rain year they are dangerous in that they are largely responsible for much of the post-kharif malaria.”

In consequence of the conditions described the tenants and labourers became heavily infected with malaria and were thus not in a favourable condition for carrying out the baling of the field channels and as a result mosquito breeding in field channels became common and fresh malaria infections resulted. Thus a vicious circle tends to become established, shortage of labour owing to malaria, inefficient baling, and as a result more malaria.

Eventually some system of drains will have to be established to carry off the flood water during the rainy season. This is not an easy problem and it will probably have to be carried out gradually, the worst areas being dealt with first.

The principle sources of mosquito breeding during the dry season of the year are the field channels. The most careful organisation and the most rigid control is needed to ensure these channels being kept dry. This organisation is easily upset by widespread illness among the Syndicate inspectors, tenants and workmen.

The problem then is to keep the population of the irrigated area well and able to work during and immediately after the rainy season in spite of the inevitable increase of mosquitoes at that time, and in spite of malaria being epidemic throughout the rest of the Gezira.

This is being worked for in the following ways :—

- (i) Widespread and early treatment of infected persons.
- (ii) Universal use of the mosquito-net.

(iii) As regards the British inspectors, measures against the house-lurking mosquitoes and close attention to the mosquito wiring of houses.

As regards (i). Throughout the irrigated area there is a small dispensary to every 15,000 feddan block. Each dispensary is staffed by a Sanitary Hakim and a tumargi. A large additional supply of quinine is issued to these dispensaries at the commencement of the rainy season. Thus every tenant and workman is within easy reach of a dispensary where he can obtain free treatment for himself or his family and from which he can be visited if too ill to attend in person. The problem is to establish the habit among the native population of seeking treatment as soon as ever they are conscious of being sick with malaria and to encourage them to recognise the existence of this disease at its onset. 120,000 tabloids of quinine were distributed in these dispensaries.

As regards (ii). The endeavours made this year to encourage the use of mosquito-nets among the tenants were not generally successful. In one 15,000 feddan block in charge of a particularly able and enlightened Block Inspector the use of mosquito-nets was widely adopted by the tenants and the results obtained were encouraging. It is hoped that before next rainy season every tenant will be in possession of a sufficient supply of nets for himself and his dependents.

As regards (iii). The importance of routine destruction of mosquitoes in the house has been much emphasised and is gradually being realised. The same applies to minute attention to mosquito wiring.

The presence or absence of malaria during the dry season depends primarily on the condition of the field channels. Other questions such as seepage from canals enter into the question, but the essential problem is to provide an organisation which will ensure these field channels being efficiently dried off between watering and watering, and to keep the malaria rate as low as possible during the rainy season so that the population may be well enough to keep the field channels baled out when once the rain has dried off.

To avoid night watering of crops the water has to be retained in the canals during the latter part of the night at a much higher level than would be necessary if watering was continuous throughout the 24 hours. The banks of the canals have proved unequal to retaining water at this high level and in consequence extensive seepage has taken place.

In 1926 considerable sums were expended in thickening and heightening the banks of the canals. In spite of this extensive seepage still takes place and a comprehensive programme for strengthening canal banks is to be undertaken in 1928.

Comparing the number of infections found in field channels and seepage pools the figures this autumn were 90 per cent. and 10 per cent. respectively. Mosquitoes have been found breeding out in field channels while at ten yards distance seepage pools which had been standing for weeks were free from larvae. The probable explanation is that the seepage water contains a higher percentage of salt than the field channel water. It is necessary in any case to prevent this extensive seepage, but it must not be supposed that it will of itself solve the question of mosquito breeding; this can only be solved by a perfect organisation for baling out field channels between the waterings, combined with careful maintenance of the larger canals.

Sanitary Organisation.

The sanitary work in the irrigated area is directly under the Senior Medical Inspector who is responsible for health work throughout the province. He has under him for the irrigated area a British sanitary inspector who has a Box Ford for transport and who has under him two native sanitary overseers each in charge of a mobile brigade of larvae searchers.

The Senior Medical Inspector also has under him for the new canalisation work :—

British medical inspector with car and under him again :—

(i) A tent field hospital with necessary staff.

(ii) British sanitary inspector with Box Ford, native sanitary overseer, and mobile mosquito brigade.

The duties of the sanitary inspectors as far as the cultivated area is concerned are purely to inspect and report. The person responsible for the drying off of field channels, filling seepage, pools, etc. is the Syndicate block inspector and it is his duty to see that the tenants carry out this work. If the sanitary staff find mosquito larvae breeding out in any field channel the Syndicate inspector is at once informed and he takes the necessary action.

Thus the effectiveness of anti-mosquito measures during the dry season depends on the energy of the Syndicate Inspector in enforcing the routine drying off of the field channels and the control that he has of the tenants in his block. At present many of the block inspectors are new to their work and have not had time to obtain an extensive knowledge of the language or to establish a really effective control of the native tenants. As year by year these inspectors become more experienced the mosquito control will become more effective.

The principle is a good one as the sole responsibility for executing and enforcing these routine measures lies entirely with the block inspector who has the power to carry them out. The sanitary staff as far as the cultivated area is concerned is only responsible for pointing out failure and to seeing that such failures are at once rectified. Thus the sanitary service is saved from maintaining large working parties to carry out mosquito work and divided responsibility for the execution of work is avoided.

As regards the main canal and main branch canals here again the duties of the sanitary staff are confined to inspection.

The Irrigation Department is responsible for maintaining these canals in a proper sanitary condition and free from grass, and for dealing with seepage. The sanitary staff report any failure to prevent mosquito breeding in these canals to the Irrigation authorities, recommend as to the course of action needed and see that the matter is successfully dealt with.

Additions to sanitary staff in the Gezira.

The appointment of an additional medical inspector with special entomological and malarialogical knowledge has been approved for work in the Gezira irrigated area. His time will be devoted to a study of mosquito breeding and other factors affecting the incidence of malaria in this area.

An additional sanitary inspector has also been approved for the irrigated area; thus there will be three sanitary inspectors working in this area, one for the southern area, one for the northern area and one for the western area. The latter will be mainly concerned with new canalisation work.

Bilharzia prevention.

All the canals of the irrigated area are now infected with bilharzia carrying snails. At first the proportion of the bullinus to the planorbis type was very high, but the planorbis snails are being found in increasing numbers.

During the non-watering season of the year under report approximately one third of the distributary canals were completely dried off so that they could be cleared out and the proper section of the canal reconstituted, and as a result the snails in these canals were killed. It was not possible to dry off the other two thirds of the distributary canals because water has to be maintained in these canals to meet the needs of the Syndicate Inspectors' houses and gardens. The canals were emptied as much as possible by closing down the inlet gates and running off as much water as possible on to the land, and were then treated with Sizolin to kill the snails.

The canals were treated in sections dealing with the length between two regulators at one time and then proceeding to the next length. The distance between two regulators was known and the average depth of water ascertained and the volume to be treated estimated. Sizolin was added and stirred in throughout the length of the portion of canal under treatment so as to bring the water of the canal to a solution strength of 1 in 20,000 of Sizolin, and the water thus treated was allowed to stand for 48 hours. Palm branches had been placed in the water 24 hours before the operation commenced and snails had become adherent to them. After 24 hours all the snails were dead. After 48 hours they were removed and placed in fresh water, but could not be revived. No ill-effects occurred from drinking the water thus treated, either to men or animals.

This operation was carried out throughout the minor distributary canals that it was not possible to dry off. It is these distributary canals which are most likely to become infected. The canals thus treated soon became reinfested with snails from the main canal and the main branch canals, but the snails of these canals are less likely to be infected. Thus when this operation had been carried out it was felt that the canals had been cleared of infected snails and were starting again reinfested, but uninfected. In the meanwhile the number of infected labourers in the irrigated area had been very much reduced by wholesale treatments and measures were being taken to prevent immigration of infected labourers from the west. It is recognised, however, that it will be impossible to prevent a certain number of infected persons from drifting into this area from other provinces and that measures will have to be taken accordingly. It is intended during the 1928 nonwatering season to repeat this operation on as wide a scale as possible, *i.e.* to dry off as many canals as possible and to treat as many as possible of the remaining canals with Sizolin.

Wad Medani Town.

A canal was dug taking off from Barakat No. 1 canal to water the gardens of the official quarter of the town. It was found that there was not enough slope on this canal to allow of it being dried off between the waterings; as a result mosquito breeding took place and cases of malaria occurred. The canal is being resectioned so that the whole length of the garden system can be discharged into the river.

Malaria became epidemic in Wad Medani town during the rainy season as a result of heavy mosquito breeding taking place in flood water discharged from the irrigated area on to the land close to the town. The drain which should take the water away from this area is being enlarged so as to be able to deal with an increased flood discharge.

A piped water supply has been installed for the official quarter of the town. The water is pumped from the river upstream of the town. The drinking water for the native town is drawn from the river and is distributed on donkeys. This source of supply is not free from danger when the river first rises and sweeps down

the filth accumulated in the half filled river bed. The water supply of the Syndicate houses in the irrigated area is drawn from the nearest canals. The water is passed through a zeer and then through a Berkefeld filter.

Port Sudan.

The water supply at Port Sudan has been still further increased to meet the growing needs of the town and the shipping. There is now a daily delivery capacity of 2400 metric tons. A large additional storage tank has been built with a capacity of 5000 metric tons. The storage tank on the east side has been covered over to prevent contamination with dust and the canvas pipes for delivery to ships have been replaced by flexible iron pipes to avoid contamination on the quays. The water has been passed as bacteriologically pure.

Conservancy.

A large destructor is in course of construction. It is designed to dispose of the contents of the latrine buckets by incineration making use of the town rubbish as fuel. At the present moment the latrine waste is dumped in the sea, but this is unsatisfactory in execution as the only available site for a quay is close to the residential quarter.

Septic tank systems for offices and first class houses are being encouraged and under the conditions existing at Port Sudan are found to act well. All open pit latrines have been abolished as being unsatisfactory.

Fly Breeding.

Fly breeding is always a very difficult problem on the Red Sea coast owing to the dampness of the climate. As a result of the heavy rainfall this year especially energetic action in this respect was called for. Flies were found to breed out in gardens manured with cotton seed waste. The ground was treated with Sulphate of Iron with successful results. The incidence of dysentery at Port Sudan is found to increase during the periods of increased humidity and is no doubt due to the increased prevalence of flies at these periods.

Mosquito Breeding.

The following collections of larvae were found and destroyed :—

<u>Stegomyia</u>	<u>Culex</u>	<u>Anopheles</u>	<u>Total</u>
143	27	2	172

If anti-mosquito measures were in any way relaxed *stegomyia fasriata* would become a prevalent mosquito at Port Sudan.

Rats and Rat Destruction at Port Sudan.

The rat population at Port Sudan is entirely of the *Rattus* species.

Three subspecies are found :—

Rattus Rattus Rattus.

„ „ *Alexandrinus.*

„ „ *Frugivorus.*

No specimens of *Rattus Norvegicus* (*Decumanus*) have been found.

The following list shows the number of rats caught in Port Sudan during the year :—

Month						Town	Docks	Total
January	..	..	..	..	..	—	—	195
February	..	..	..	..	..	—	—	229
March ..	..	..	..	..	..	—	—	203
April ..	..	..	..	..	..	—	—	234
May ..	..	..	..	..	..	186	183	369
June ..	..	..	..	..	..	182	119	301
July ..	..	..	..	..	..	157	117	274
August	..	..	..	..	..	186	108	294
September	..	..	..	..	..	216	236	452
October	..	..	..	..	..	154	234	388
November	..	..	..	..	..	211	139	350
December	..	..	..	..	..	176	265	441

The following flea counts were made on fleas at different times of the year :—

						Rats	Total fleas
July	..	..	..	..	..	14	1
September	..	..	..	..	..	24	7
October	..	..	..	..	..	15	12

Tokar.

A piped water supply has been provided for this rapidly growing town. The water is pumped from a deep well, six miles from the town. This replaces a donkey-carried supply from very brackish wells near the town.

A double bucket system for sewage removal has been installed.

All collections of mosquito larvae found have been *Culex* or *Stegomyia*.

Gebeit.

A decauville line has been laid down for conservancy bucket removal.

Kordofan.

A piped water supply for El Obeid town is in course of installation and is nearing completion. The water which is drawn from deep wells, is pumped into storage tanks and automatically chlorinated. Owing to the limited total supply of water available in the neighbourhood the water is only delivered to houses in the official quarter, but water is led to stand pipes in the native town for the use of the native population. This is a step in advance as up to now water has been obtained from shallow wells and carried to all houses on donkeys.

Atbara Water Supply.

The inlet pipe of the Atbara town water supply takes its water from the main Nile above the town and about half of a mile down-stream of the mouth of the Atbara river.

During the flood the water of the Blue Nile and the Atbara is heavily laden with red silt carried down from the Abyssinian mountains. In addition to this

fertilising silt at the beginning of the flood and a great deal of filth of animal and human origin is washed down from the river bed. This is particularly the case with the Atbara river which only flows for part of the year. To meet this sedimentation tanks have been installed and these together with Alum treatment give a clear water supply all the year round.

Bacteriological examination has not indicated up to date the need for filtration or chlorination, but the position is being watched.

VITAL STATISTICS.

The duty of reporting births and deaths in the northern provinces is carried out by the Maazuns, officials of the Legal Department, who register marriages. The Maazuns receive a piastre for every case reported. In these provinces the Maazuns seldom have to deal with more than three villages and the births and deaths for the most part are accurately reported except in the two southern districts of Halfa Province, which are barren, and the population scattered and difficult of supervision.

The lists compiled from the Maazuns' reports are used by the sanitary barbers for vaccinating, so that a check is kept on the accuracy of the Maazuns' reports.

The birth and death rates for these northern provinces work out at :—

	Births.	per 10000	Deaths	per 10000
Khartoum	3,588	184.0	2,599	133.2
Berber	4,278	217.8	2,523	167.0
Dongola	5,539	339.2	2,323	142.5

In the central Sudan the position is different; here there is often one Maazun for as many as 20 or 30 villages. It is impossible for the Maazuns to obtain accurate returns from such large districts and in consequence the vital statistics available for these provinces are completely unreliable.

To meet this difficulty in the Blue Nile Province, where it is particularly desired to obtain accurate statistics, the duty of reporting births and deaths was transferred from the Mazzuns to the Omdas. Each Omda is in charge of a collection of villages and the Sheikhs of the villages are responsible to him. He is able to collect the necessary information through his Sheikhs. The Omda receives two piastres for each birth or death reported. This change was introduced in the early part of 1926. The numbers of births and deaths reported in this Province for the last three years are as follows :—

	1925	1926	1927
Births	1,850	3,661	7,015
Deaths	1,246	1,940	4,497

It is hoped to extend this system to the White Nile Province and Kordofan Province at an early date. The vital statistics in these two provinces are entirely unreliable, but it should be possible to obtain adequate statistics if this change in method is effected.

The condition of the inhabitants and the nature of the administrative control in the other provinces is such as to preclude the possibility of obtaining useful vital statistics with regard to the bulk of the population for some years to come. Birth and Death returns in these provinces are obtained from the larger towns only.

Population increase.

The woman of the northern and central Sudan is relatively unfertile compared to the European woman when unaffected by birth control methods, or to the Egyptian woman. It is rare for the woman of the northern and central Sudan to have more than five children. The majority of them have less. The following averages are based on a considerable number of figures collected in Kassala Province and the Blue Nile Province:—

	Average number of children per wife.	
	Kassala Province	Blue Nile Province
West Africans	3	2.5
Arabs	—	2.2
Arabs (Hemitic)	2.5	—
Negroid	—	1 5

This lack of fertility is probably attributed in part to the climate and the circumstances of life in the Sudan but, more to the prevalence of syphilitic infection and in certain areas to the effects of malaria on the pregnant women and the newlyborn children.

QUARANTINE.

(1) WADI-HALFA QUARANTINE.

The quarantine season lasted from May 1927 to February 1928, and the figures given refer to this period.

A Syrian medical officer was posted to Wadi-Halfa especially for quarantine work, and was assisted by the Syrian medical officer in charge of Wadi-Halfa civil hospital, who was able to devote a great deal of time to this work.

Two Sudanese laboratory assistants were employed to examine faeces and urine under the direction of the medical officer.

During this time 8,763 Egyptian labourers passed through the quarantine 614 were rejected and repatriated. The causes of rejection were as follows:—

Visible blood in urine	547
Favus	19
Syphilis	5
Hernia	1
Orchitis	1
Youth	17
Heart disease	1
Anaemia and emaciation	4
Blindness	5
Old age	2
Tuberculosis	1
Pneumonia	1
Pleurisy	1
Various	9
TOTAL	614

Bilharzia.

547 (6.2 per cent.) were rejected on account of visible blood in the urine. Of the remainder 1,832 (22.3 per cent.) had blood in the urine, and 1,827 (22.2 per cent.) had bilharzia ova. 1,181 of the bilharzia cases, who were destined for the Gezira, were detained until cured, and then sent on to their destinations. The remaining 646 who were not going to areas that were likely to become infected were allowed to proceed to their destinations to be treated there.

Arrangements have been made for all labourers to be examined for bilharzia infection by a British doctor before leaving Egypt, and it is hoped that this will reduce the percentage of rejections to a minimum, and avoid the expense of the repatriation or treatment of infected labourers.

The following list shows the number of cases under treatment for bilharzia on the 1st and 15th day of the various months. Examination of labourers at Luxor commenced on 1st February, 1928.

1927	June	1st	73
	"	15th	73
	July	1st	Nil
	"	15th	
	August	1st	
	"	15th	
	September	1st	
	"	15th	262
	October	1st	
	"	15th	442
	November	1st	263
	"	15th	86
	December	1st	119
	"	15th	303
1928	January	1st	352
	"	15th	178
	February	1st	100
	"	15th	64

Ankylostoma.

1,837 (20.9%) were found to be suffering from ankylostoma and were treated.

The following are the numbers and destinations of the labourers who passed through the quarantine:—

Date of arrival.	No. of men	Rejected	Passed	Destination
20. 5.27.	266	10	256	Messellemia
21. 9.27	192	7	185	Abu-Usher
29. 9.27.	1,100	47	1,053	Gezira
7.10.27.	556	19	537	"
12.10.27.	308	46	262	"
22.10.27.	446	127	319	"
22.10.27.	100	—	100	Kassala
31.10.27.	309	22	287	Gezira
18.11.27.	489	26	463	"
20.11.27.	200	—	200	Kassala
21.11.27.	300	1	299	Gezira
22.11.27.	100	—	100	Aroma (Kassala)
29.11.27.	600	91	509	Kassala
4.12.27	600	21	579	"
6.12.27	299	24	275	"
7.12.27.	297	24	273	Gezira
11.12.27	247	18	229	"
12.12.27	61	—	61	Makwar
13.12.27	300	—	300	Gezira
18.12.27.	600	34	566	Gezira
21.12.27.	231	13	218	"
22.12.27.	126	15	111	Makwar
22.12.27.	80	—	80	Aroma (Kassala)
1. 1.28.	277	29	248	Messellemia
10. 1.28.	79	3	76	Hag Abdulla
10. 1.18.	70	3	67	Abu Usher
20. 1.28.	382	10	372	Hag Abdulla
20. 1.28	53	15	38	Abu Usher
10. 2.28.	95	9	86	" "
TOTAL	8,763	614	8,149	

The following table shows the number and percentage of labourers who were passed through affected with certain symptoms and infestations:—

No. of men passed.	Haemat- uria	Bilharzia Ova	Oxyuris	Ankylost- oma	Ascaris	Taenia
8149	1832	1827	1964	1837	634	464
	per cent. 22.3	per cent. 22.2	per cent. 24.1	per cent. 20.9	per cent. 7.7	per cent. 5.7

The following staff were employed:—

Permanent:—

Two laboratory men.
One fitter.
One chief ghaffir.

Temporary:—

21 ghaffirs and workmen.
One cook.

(2) PORT SUDAN QUARANTINE.

The following is a list of ships quarantined at Port Sudan during the year under report and the three previous years :—

	1924	1925	1926	1927
Ships entering	650	792	820	845
Sambuks entering	589	395	393	562
Ships of War :—				
British	10	22	20	21
French	—	—	—	5
Italian	—	—	—	1
Ships quarantined	—	—	—	2
Patients placed in quarantine hospital	—	—	—	5

A number of sambuks arrived at Port Sudan from Arabia without papers. The crew were vaccinated and placed under surveillance.

Ships Quarantined.

30.6.1927. S.S. "Rommelli," Turkish flag from Jeddah and Yanbo carrying pilgrims. Reported one death at sea. Took coal and water in quarantine and left.

13.8.1927. S.S. "Sunpath," British, from Seychelles to Birkenhead. Man admitted to quarantine hospital suffering from Bubo in groin. Bacteriological examination negative to bacillus pestis. Ship left the port in quarantine.

Quarantine Station.

The site of the present quarantine station is unsuitable owing to its situation in a developing commercial area. A suitable site for a new quarantine station north of the railway bridge has been approved. It is hoped that building operations will be commenced shortly.

(3) PILGRIM QUARANTINE AT SUAKIN.

The pilgrim quarantine at Suakin which had previously been under the administration of the International Quarantine Board at Alexandria was handed over to the Sudan Government on January 1st 1927, to be administered by the Sudan Medical Service. This was a great step in advance as it placed this Port which was part of the first line of sanitary defence of the country under the general sanitary administration of the Sudan.

Building Programme.

The following building programme was commenced as soon as possible after the transfer had taken place, but it was not completed before the return of the pilgrims. It is hoped that it will be fully completed before the return of the pilgrims in 1928.

General Hospital.

Extension to provide additional accommodation for patients and a clinical laboratory. 2nd Storey to provide accommodation for an English nurse.

Isolation Hospital.

Shelters for pilgrims in the sections.

Latrines.

Alterations of flushing arrangements and sewage disposal.

Water.

A large and higher salt water tank to ensure better water supply to sections and latrine.

Lighting.

Installation of electric lighting.

All pilgrims before leaving for the Hedjaz are:—

- (i) Vaccinated against small-pox.
- (ii) Inoculated against cholera.
- (iii) Given a passport on which is a photograph of the pilgrim and which shows that he has been vaccinated, inoculated against cholera and has paid:—
 - (a) The Hedjaz quarantine fees.
 - (b) Return steamer fare.
 - (c) Cost of maintenance in Suakin quarantine on return.

The total sum paid by the pilgrim is 297 piastres. This is constituted as follows:—

	P.T.
Steamer fare	120
Hedjaz quarantine dues	97
Sudan consolidated charge	80
	297

The consolidated charge is made up as follows:—

	P.T.
Quarantine fees	50
Passport	5
Food	10
Cash to be handed to pilgrim on return	15
	80

A small sum of 15 piastres remains over and is handed to the pilgrim when he leaves the quarantine station after his return to ensure his support until he can either get back to his village if a native of the Sudan or find work if he is a West African.

The quarantine dues were decreased from 108 piastres to 50 piastres.

In spite of this the pilgrims had to face a heavy increase in their deposit as this was the first occasion on which they were made to pay their return fare in advance.

The steady increase of fees demanded from the pilgrims before leaving which has taken place during the last few years under the headings of charges at Suakin, charges in the Hedjaz, and steamer fares, has had a deterrent effect on many of the West African pilgrims who now prefer to go by Massowah where they escape vaccination and inoculation and can get a passage across to the Yemen in a sailing boat for 75 piastres. After that, escaping the Hedjaz dues, they beg their way to Mecca, returning to Jeddah after the pilgrimage in a destitute condition. At Jeddah they remain a prey to, and a source of, infection until they can obtain a passage to Suakin where they arrive in a debilitated condition and have to be maintained in the quarantine station at the expense of the Government.

On the other hand although a considerable number of West African pilgrims refuse to pay these increased dues and find their way round by Massowah it must be remembered that they all can and many of them do earn the necessary sum of money by working in the cotton plantations in the Gezira, at Tokar and at Kassala.

The 1927 Pilgrimage.

The pilgrims commenced to leave Suakin for the pilgrimage on 16th January 1927.

The departures took place as follows:—

Boat	Flag	Date departure	Men	Women	Infants	Total
Mansourah ..	British	16.1.27.	9	8	2	19
Borullos ..	„	25.1.27.	4	—	—	4
Mansourah ..	„	6.2.27.	9	5	—	14
Kenah ..	„	15.2.27.	4	6	—	10
Mansourah ..	„	26.2.27.	12	8	2	22
Kenah ..	„	7.3.27.	20	11	3	34
Borullos ..	„	8.3.27.	1	1	3	5
Mansourah ..	„	17.3.27.	11	8	3	22
Borullos ..	„	27.3.27.	4	—	—	4
Mansourah ..	„	7.4.27.	11	7	1	19
Kenah ..	„	17.4.27.	15	10	9	34
Mansourah ..	„	27.4.27.	47	25	6	78
Kenah ..	„	9.5.27.	175	158	29	362
Mansourah ..	„	17.5.27.	240	221	29	490
Mansourah ..	„	30.5.27.	413	184	18	615
						1,732

The first boat load of returning pilgrims arrived at Suakin on June 17th. After the end of July there were few Sudanese among those returning.

The following statement shows the dates of arrival of the various pilgrim steamers:—

Steamer	Flag	Date arrival	Nationality	Adults	Half	In- fants	Total
Kenah	British	17. 6.27.	Sudanese	156	1	1	158
			W. Africans	—	—	—	—
			Passengers	5	—	—	5
Kairon	„	28. 6.27.	Sudanese	195	5	4	204
			W. Africans	54	—	2	56
			Passengers	11	—	—	11
Mansourah	„	7. 7.27.	Sudanese	33	1	—	34
			W. Africans	37	1	7	45
			Passengers	11	—	—	11
Kenah	„	14. 7.27.	Sudanese	9	—	1	10
			W. Africans	33	—	2	35
			Passengers	8	—	—	8
Mansourah	„	30. 7.27.	Sudanese	354	7	4	365
			W. Africans	109	3	7	119
			Passengers	24	—	—	24
Kenah	„	10. 8.27.	Sudanese	5	—	—	5
			W. Africans	45	1	3	49
			Passengers	16	—	—	16

Steamer	Flag	Date arrival	Nationality	Adults	Half	In- fants	Total
Mansourah	British	16. 8.27.	Sudanese	—	—	—	—
			W. Africans	41	4	5	50
			Passengers	13	—	—	13
Keneh	„	26. 8.27.	Sudanese	1	—	—	1
			W. Africans	29	—	7	36
			Passengers	23	—	—	23
Mansourah	„	7. 9.27.	Sudanese	—	—	—	—
			W. Africans	72	6	4	82
			Passengers	16	—	—	16
Keneh	„	16. 9.27.	Sudanese	1	—	—	1
			W. Africans	36	1	8	45
			Passengers	11	—	—	11
Mansourah	„	27. 9.27.	Sudanese	—	—	—	—
			W. Africans	56	5	5	66
			Passengers	7	—	—	7
Keneh	„	6.10.27.	Sudanese	2	—	—	2
			W. Africans	19	—	2	21
			Passengers	5	—	—	5
Mansourah	„	17.10.27.	Sudanese	1	—	—	1
			W. Africans	7	—	—	7
			Passengers	20	—	—	20
Keneh	„	26.10.27.	Sudanese	—	—	—	—
			W. Africans	3	—	1	4
			Passengers	12	—	—	12
Mansourah	„	7.11.27.	Sudanese	1	—	—	1
			W. Africans	5	—	—	5
			Passengers	4	—	—	4
Mansourah	„	28.11.27.	Sudanese	1	—	—	1
			W. Africans	1	—	—	1
			Passengers	14	—	—	14
Keneh	„	7.12.27.	Sudanese	1	—	—	1
			W. Africans	—	—	—	—
			Passengers	—	—	—	—
Mansourah	„	17.12.27.	Sudanese	1	—	—	1
			W. Africans	2	—	—	2
			Passengers	—	—	—	—
Keneh	„	27.12.27.	Sudanese	1	—	—	1
			W. Africans	—	—	—	—
			Passengers	—	—	—	—
TOTAL			Sudanese	785			
			W. Africans	623			
			Passengers	200			1,608

Of the 1,608 returning pilgrims included in the above list 58 had gone to the Hedjaz via Massowah.

The following statement shows the dates of arrival of indigent pilgrims sent in sailing boats (sambuks) by the British Consul at Jeddah as no provision had been made for their return journey by steamer.

Of these 1,119 destitute pilgrims 1,055 had left for the Hedjaz via Massowah.

Sambuk	Date	Total number in batch.			Total
		Men	Women	Children	
Mujelli	6.10.27	50	33	10	93
Musahel	6.10.27	43	56	8	107
Fateh Rahman ..	6.10.27	96	70	13	179
Manshir	10.10.27	184	111	35	330
Sahala (I)	13.10.27	62	50	11	123
Sahala (II)	16.10.27	55	49	29	133
Manshir	15.11.27	68	59	27	154
		558	428	133	1119

Thus a total of 2,728 pilgrims returned via Suakin between June 17th and 31st December, 1927. Of these 48 were returning from previous pilgrimage.

The following list shows the number of pilgrims who returned to the Sudan between January 7th and April 17th 1927. These pilgrims do not belong to the 1927 pilgrimage, but were returning from previous pilgrimage :—

Steamer or sambuk	Date	Men	Women	Children	Total
Fatteh Kheir	7.1.27.	25	8	1	35
Borullos	8.1.27.	1	1	—	2
„	20.2.27.	—	2	—	2
Mansourah	17.3.27.	1	—	—	1
Kench	17.4.27.	1	—	—	1
TOTAL					41

Health.

The pilgrimage was declared clean. Outbreaks of small-pox occurred at Mecca, Jeddah and Yanbo. A few cases of small-pox occurred among returning pilgrims either on the steamers or afterward in quarantine. No epidemic occurred and no cases occurred after the end of July.

A number of inhabitants of the Hedjaz proceeding to Port Sudan to obtain treatment for medical and surgical complaints received preliminary treatment while detained in the pilgrim quarantine station.

Bilharzia.

The urines of all returning pilgrims with the exception of the 1st steamer load were examined for bilharzia ova.

2,565 cases were examined. Of these 94 were positive for bilharzia. Of these ninety four, 75 were West Africans.

TRAINING.

(1) KITCHENER SCHOOL OF MEDICINE.

Ten students from the Gordon College were admitted to the school in January 1927 and commenced the first year course. Of these seven satisfied the examiners at the end of the year. Two were referred back for a further year in the first year class and one was recommended to discontinue his medical studies and was found other employment.

Final examinations were held at the end of the year. Two assessors were brought up from Cairo to supervise the general conduct of the examination and to regulate the standard to be maintained.

Seven of the eight final year students satisfied the examiners and were granted licences to practise. The eighth was referred for a further year's study. The seven successful candidates are being posted as House-Surgeons and House-Physicians at seven of the larger hospitals.

(2) LABORATORY ASSISTANTS.

Three additional laboratory assistants have completed their training this year at the Wellcome Tropical Research Laboratories.

There are now nine native male laboratory assistants and one female laboratory assistant stationed at nine of the larger hospitals.

They are able to carry out routine microscopic examinations and thus greatly lighten the work of the medical staff.

(3) SUBORDINATE MEDICAL STAFF.

Twelve Dispensary Hakims and thirteen Sanitary Hakims completed training during 1927.

(4) MIDWIFERY TRAINING SCHOOL AT OMDURMAN.

Twelve midwifery probationers were selected by the Matron during her tour in the autumn of 1926. They all successfully completed the course of training and received licences to practise midwifery.

The probationers were selected from the provinces : —

Khartoum Province	..	..	..	..	2
Berber Province..	..	..	..	..	2
Dongola Province	..	..	..	..	7
Blue Nile Province	..	..	..	..	1

Method of Training.

The course of training is for a period of six months. During this time the probationers live at the school and discipline, punctuality, tidiness and scrupulous cleanliness are rigidly enforced. This disciplinary supervision is not the least important part of their training. During the six month's training each probationer has personally to carry out 20 deliveries, and must be present at 40 other deliveries. In addition she is shown any cases of difficult labour admitted to hospital.

A course of lectures is given and is illustrated by demonstrations on a model and by the use of plasticine. The Matron has an exceptional knowledge of Sudanese Arabic and by detailed explanation and by the use of these models the probationers succeed in acquiring a very good grasp of the subject.

The outside work of the school.

The total number of cases attended during the year was 338. Fifty eight cases of complicated labour were dealt with. These included abnormal presentations such as brow, face, transverse and complicated breech. One case of contracted pelvis in a dwarf had to be admitted to hospital for caesarian section. There were also cases of placenta previa hydramnios and prolapse of cord. In 18 cases serious difficulty was encountered owing to pharaonic circumcision. Epiphysiotomy had to be performed in 12 cases. In three cases labour was complicated by fibroid tumours.

It is thus seen that the field of experience was wide, and afforded good opportunities for practical instruction.

Tour in the Provinces.

In November and December the Matron carried out a tour of inspection in the Blue Nile, the White Nile, Kordofan and the Nuba Mountains Provinces.

The object of these tours is fourfold :—

- (i) To inspect the midwives who have been trained in the Omdurman school and to see that they are carrying on their work properly and under suitable conditions.
- (ii) To inspect the untrained midwives and if they conform to a certain very low standard of efficiency to renew their licences; if they do not conform to this standard to cancel these licences.
- (iii) To get in touch with leading natives of the country and in particular with wives, and to interest them in the training of midwives and nurses and in the development of medical work among women.
- (iv) To select women for training as midwives and nurses.

Ten of the trained midwives were inspected and some of these while actually at work; they were found to be carrying on their work satisfactorily. The Matron points out that these trained midwives are at a disadvantage as compared with the untrained women because they have been taught and are expected to maintain a higher standard both in their work and in their manner of life, but the fees they receive are the same as those of the untrained women: that is to say very small indeed. As the people come to realise the tangible advantage of employing the trained midwives the difficulty will arrange itself in accordance with the laws of supply and demand. In the meanwhile the Government is meeting the difficulty by granting a small retaining fee to the trained midwives.

Children suffering from minor ailments or requiring dressings are brought to some of the trained midwives. This should prove the beginnings of child welfare in these out of the way parts and will it is hoped be developed later by the establishment of Child Welfare Dispensaries in these places as foreshadowed under nurses training (*vide infra*).

Untrained Midwives.

Seventy untrained midwives were inspected. One of these was quite blind, and in many cases they were very dirty. It was arranged for some of the younger women themselves to come to Omdurman for training in the midwifery school and some of the older women were persuaded to send their daughters to be trained so that they may take their places on their return.

Work up-to-date.

This midwifery school has now been established for seven years. Up to date 77 midwives have completed their course of training and of these 76 are following their vocation. They are distributed as follows :—

Staff nurses in midwifery school	..	..	2
Practising at Omdurman	..	..	21
„ Khartoum	..	..	13
„ Khartoum North	..	..	5
„ Berber Province	..	..	7
„ Dongola Province	..	..	6
„ Kordofan Province	..	..	8
„ White Nile Province	..	..	13
„ Kassala Province	..	..	1

There are certain very encouraging features about this work :—

- (i) The steady improvement in the type of women coming forward for training.
- (ii) In consequence of (i) the better progress made during the six months course of training.
- (iii) The growing appreciation of this work at Omdurman and in the provinces.

The standard of midwifery has been raised to a higher level at Omdurman and Khartoum, but it will be a long time before this level can be reached in the provinces.

Many of the old untrained midwives are incredibly dirty and ignorant, but it is useless to attempt to forbid them to practise until they can be replaced by trained women. This is gradually being done. The need for better midwifery is continually emphasised by the occurrence of cases of death or prolonged illness due to bad midwifery, but it is only in exceptional circumstances that such cases are brought to the knowledge of the doctors. The majority of cases, far from any hospital, suffer and die unreported.

The pharaonic circumcision of women, cruel in its execution on the young girl, a permanent mutilation throughout life and a cause of anxiety and danger at every child-birth is the universal custom throughout the Arab and Arabised Sudan.

European influence even though backed by the advice and authority of their own religious leaders is powerless in any way to affect this custom. It is hoped that in course of time as the trained midwives increase and become universal throughout the provinces their influence will effect a change of thought on this matter and it is hoped that in this way the custom will gradually fall into abeyance.

At present the trained midwives with only six months enlightened teaching are isolated in the provinces amid a sea of conservatism and prejudicial customs. As their numbers increase they will afford each other support and the progress achieved will be steadily accelerated.

It is suggested that this work is being conducted on the surest principles. It is work carried out entirely through the native and through their most conservative element, the women. It is not attempting rapid revolutionary changes in a small part of the population, but a gradual enlightenment and improvement over a large area and it is introducing that enlightenment into the very foundations of the people, their homes.

(5) NURSES TRAINING SCHOOL AT OMDURMAN.

At the end of 1927 seven nurses successfully completed their training at this school. These were the first nurses to receive a systematic organised course of training in the Sudan.

In addition to being instructed in routine nursing duties all these women can test urine, treat trachomatous eyes and give intravenous and intramuscular injections. Four of them can read and write well, the others only a little. Two of the seven underwent a course in midwifery subsequently to having completed their nurses' training. It is intended to make this midwifery training an integral part of the nurses' course in future.

Disposal of trained nurses.

Of the seven women who successfully completed their course three have been retained as a training nucleus in the Omdurman hospital. The other four have been sent out to provincial hospitals at Kassala, Wad-Medani, Atbara and Port Sudan.

Recruitment of Probationers.

In all 20 women have been engaged for training up to end of 1927. They were obtained as follows :—

Selected by Matron of Midwifery School while	
on tour	5
Brought by staff midwife	3
From Church Missionary Society Hospital ..	3
Midwives who had been trained at Midwifery,	
school	3
Daughter of a midwife	1
Local women coming of their own accord ..	4
Patient who volunteered	1

It will be seen that most of these probationers were obtained directly or indirectly through the Midwifery School.

Of these twenty, two resigned, four were discharged, seven completed their training and seven are still under training.

Initial difficulties.

At first most of the Matron's time was taken up accustoming the probationers to obedience and discipline. Anyone who has had to deal with native Sudanese women and knows their failings:— mental, moral and physical lethargy, combined with violent fits of temper and a complete absence of a sense of personal responsibility, will realise how difficult this task was. With the exception of two who had been at Rufaa school these women had never been under any kind of restraint. The final result, in those who have completed their two years' training, appears to be very satisfactory. Apart from their vocational attainments they have become clean, tidy, better mannered, quicker in thought speech and action.

Of the four discharged it was only found impossible to train three. The fourth was teachable, but unsuitable on other grounds.

Method of Training.

Training has consisted of practical work in the wards and lectures. The practical work included the ordinary routine of nursing such as bed making, washing, feeding, taking temperature, giving enemata, etc. In addition they have been taught the technique of intravenous and intramuscular injections and the treatment of trachoma. Each has in turn worked in the different parts of the hospital, outpatient department, dispensary, operating room and infectious block.

The lectures have been limited in their scope by the illiteracy of the probationers, but it will be possible to raise the standard when a more educated type of woman becomes available. Instruction in reading and writing Arabic have been given to the nurses by a teacher from Omdurman School, but very little progress was made in this direction during the two years' training.

Future Progress.

The ultimate success of the school depends on being able to obtain women for training who are intelligent and of a good class. It is very desirable that these women should be able to read and write before commencing training, but for that it is necessary to wait for further educational progress among the women of the Sudan.

Young unmarried girls are not generally desirable for training as although they may be happy and contented during the period of training while they are living with the other probationers, the despatch of such a girl to a provincial hospital where no living arrangements exist, raises great difficulties.

There is reason to anticipate that here, as was the case with the midwifery school, applicants of a suitable type will come forward in increasing numbers as the work progresses and its object and character become better understood. As the number of applicants of the right class increases it will be possible to make a stricter selection of probationers as regards intelligence, age and general suitability. In the meanwhile a tradition of cleanliness, quickness and obedience is being established among those under training which will greatly facilitate the training of successive classes of probationers.

The progress made during these first two years and the standard attained by the seven nurses who have successfully completed their training afford good grounds to anticipate further progress in the future. The standard of male nursing has been very much improved throughout the Sudan during the last twenty years. Formerly the male nurses were mostly illiterate, careless and unreliable, but the position was relieved by the existence of a limited number of men with a real liking and aptitude for nursing who though often illiterate were not only good nurses, but often good anaesthetists. During the last seven years selected male nurses from the hospitals have been specially trained as Dispensary Hakims and Sanitary Hakims of whom there are 128 in charge of larger and smaller dispensaries in various parts of the Sudan. The hospital attendants are now recruited from intelligent boys from the provincial schools who can read and write well and enter the hospitals in the expectation of steady promotion and the hope of being put in the charge of a dispensary after a period of years. In fact the standard of nursing in the male wards has been completely altered.

It is hoped to be able to repeat this gradual revolution in the case of the female wards and to carry it a stage further as far as the actual technique of nursing is concerned, because the female nurses will receive systematic nursing teaching by an expert in a way that cannot at present be arranged for the male attendants at provincial hospitals. On the other hand the female nurse will not for many years to come be able to attain the same level of education, quickness and general intelligence.

Similarly it is hoped in the course of a few years to give to the best and most experienced of these female nurses a further course of training which would include simple dispensing, the treatment of simple medical and surgical emergencies, and in particular in the ante-and post-natal care of mothers and in the care of infants and children. It is thus hoped in the course of some years to have a number of mother and child welfare dispensaries staffed by these especially trained nurses situated in centres of population that are out of reach of the provincial hospitals. By providing these higher posts for nurses in which they can occupy positions of greater responsibility and more independent action it is anticipated that we shall not only be filling a serious gap which now exists in our curative and preventive medical work, but we shall be rendering more attractive this new service which it is most important should attract the best and most progressive element among the better class Sudanese women.

EXPENDITURE ON MEDICAL WORK.

The expenditure on medical work during the year under report showed an increase of £E. 21,144. This increased expenditure is chiefly under the following headings :—

(1) Increased Staff and Transport needed :—

- (a) For the increased areas under irrigation in the Gezira.
- (b) For the extension of the Kassala Railway.
- (c) For the Pilgrim Quarantine station at Suakin taken over from the International Quarantine Board.
- (d) To deal with a serious epidemic of relapsing fever in Darfur Province.

(2) Increase on drugs, dressings and equipment at hospitals, and dispensaries.

- (a) This is accounted for by general increase at existing hospitals.
- (b) By sudden increase of medical work in the Upper Nile Province as a result of eight years' steady medical penetration.
- (c) By increase of dispensaries.
- (d) By increase of work in the Gezira irrigated area.

This increased expenditure can be broadly classified under the following headings :—

(i) Increased medical expenditure necessitated by and inseparable from some new agricultural or economic development or the taking over of a new service, *e.g.* the Gezira Irrigated Area extension, the Kassala-Gedaref Railway, and the Pilgrim Quarantine station.

(ii) Increased expenditure due to the normal increase of work in existing hospitals and dispensaries. This varies according to the district, and tends to be greatest in unsophisticated areas which are becoming sophisticated. It is impossible to turn away patients who are in need of treatment, so it has to be looked on as obligatory increased expenditure.

(iii) Increased expenditure due to epidemics. Epidemics are like earthquakes and floods - they occur and they have to be dealt with, but unlike these other acts of God they can to a great extent be guarded against. Epidemics in the Sudan now only attain serious proportions in the less administered border areas where little medical work has been done and the medical confidence of the people has not been gained. Here epidemic diseases are imported from across the border and are not reported until they have reached formidable proportions. The best safeguard against such epidemic outbreaks is to gain the confidence of the inhabitants of these areas in medical matters. The areas especially concerned are the southern area of the Fung Province, the southern area of the Upper Nile Province, Darfur Province and Mongalla Province.

Up to fifteen years ago devastating epidemics of cerebrospinal fever were common in the northern and central Sudan. Now they only occur in the border areas. In 1919 the whole of the Upper Nile Province was devastated by small-pox; now in all but the extreme south, cases of small-pox and even chicken-pox are reported at once, and in consequence epidemics only reach considerable proportions in the southern areas.

(iv) Increase of hospitals and dispensaries to meet the general needs of the population and not inevitably conditioned by some new development scheme. This is the item of increased expenditure which it is possible to choose definitely and say it is possible or it is not possible to sanction this increased expenditure. But it is nearly always very difficult to refuse this expenditure as often it is very strongly pressed for by the administrative authorities on political grounds. Moreover it may be very unwise to check medical development in an undeveloped and uncivilised area, as the development of medical work in such areas is the best safeguard against epidemics, and epidemics when they occur have to be dealt with and often at great expense.

In the old days the people in these areas existed without medical help. Disease was untreated and although the population did not increase, it did not die out and a fair level of physical efficiency was maintained, but it must be remembered that in the past the spread of infectious disease was reduced to a minimum by the fact that people seldom left their own village and if migratory they kept to their own fellowship or clan. This is no longer the case. The establishment of an ordered administration makes it safe for clan to mix with clan. People come from long distances to buy and sell in the markets. Cotton is carried and sold in Government centres. Men are collected for work on roads.

Thus diseases such as yaws, once restricted to limited areas, become widely disseminated, and syphilis, bilharziasis and ankylostomiasis are introduced from the north.

Once a people have become involved in the movement and free intercourse inseparable from an ordered Government and modern conditions, it is no longer possible to leave them to face the diseases which have been introduced or spread by Arab or European penetration, as if medical service is not provided widespread epidemics and even depopulation on a serious scale from the spread of endemic diseases may have to be faced.

The introduction into any area of an ordered administration brings with it not only the moral responsibility, but the economic necessity for medical and sanitary work. This makes the limitation of medical and sanitary expenditure a very difficult problem, not only in a developing country, but also in a country as yet undeveloped, but which is being exposed to the free intercourse and movement inseparable from such administration.

(Sgd.) O. F. H. ATKEY,
Director Sudan Medical Service.

SUDAN MEDICAL SERVICE STAFF.

Appointment	Establishment
Medical Staff :—	
Director	1
Asst. Director (M. O. H., Khartoum Province)	1
Director, Khartoum Civil Hospital	1
Director, Omdurman Civil Hospital	1
Senior Medical Inspectors	2
Medical Inspectors	22
Medical Officers (Syrians)	31
Dispensary Hakims (Sudanese)	51
Sanitary Hakims (Sudanese)	47
Dispensers	6
Pathological Assistant	1
Laboratory Assistants (Sudanese)	6
Nursing Staff :—	
Matron, Khartoum Civil Hospital	1
Matron, Omdurman Civil Hospital	1
Matron, Midwives Training School	1
Nursing Sisters (Khartoum, Port Sudan, Atbara and Wad Medani)	6
Sanitary Staff :—	
Chief Sanitary Inspector	1
Senior Sanitary Inspectors	3
Sanitary Inspectors	11
Sanitary Overseers (Sudanese)	47
Clerical Staff :—	
Superintendent	1
Clerk (British)	1
Translator (Grade V)	1
Translators (Grade VI)	3
Translators (Grade VII)	9
Translators (Grade VIII)	3
Clerks (Grade VII)	10
Clerks (Grade VIII)	10
Chief Accountant (Grade V)	1
Accountants (Grade VI)	1
Accountants (Grade VII)	5
Accountants (Grade VIII)	3
Stores Staff :—	
Medical Storekeepers	2
Asst. Medical Storekeeper	1
Storemen (Sudanese)	4
Tailors	2
Carpenter	1

CHANGES IN PERSONNEL.

The following changes in personnel occurred during 1927 : —

Medical Inspectors :—

Mr. D. R. Macdonald	Appointed	30. 1.27.
Mr. E. P. Pratt	„	30. 1.27.
Dr. C. Voigt	„	7. 2.27.
Mr. J. Duncan	„	21. 2.27.
Mr. J. W. Wallace	„	16. 4.27.
Mr. G. D. Rankin	„	18. 5.27.
Mr. H. M. Elliott	„	31. 7.27.

Medical Officers :—

Dr. K. M. Khouri	To pension	2. 1.27.
Dr. Y. H. Haddad	Discharged	6. 1.27.
Dr. Y. M. Azm	Resigned	1. 4.27.
Dr. M. Nuwayri	Discharged	30. 8.27.
Bimb. Yusef Eff. Mezher	To S. D. F.	7. 12.27.
Dr. R. Mocmalgi	Appointed	24. 1.27.
Dr. N. Kamar	„	21. 3.27.
Dr. S. Y. Najjar	„	28. 3.27.
Yuzb. Emile Eff. Naim	From S. D. F.	8. 3.27.

Sleeping Sickness Officers :—

M. A. Boghos Eff. Shamlan	To S. D. F.	19. 3.27.
M. A. Fuad Eff. Saikali	„	1. 11.27.
M. A. Emmanuel Eff. Terzian	From S. D. F.	9. 2.27.
M. A. Tewfik Eff. Minassian	„	1. 4.27.

Sanitary Inspectors :—

Mr. H. Taylor	Appointed	17. 7.27.
Mr. R. C. N. Baker	Accidentally Killed	15. 12.27.

TABLE I.

Shows number of out-patients during 1927.

	Total.	%	Free.	%	On Payment.	%
Government Employees ...	214,463	19.6	210,134	19.2	4,329	.4
School Children	114,338	10.4	114,314	10.4	24	—
Prisoners	67,994	6.2	67,994	6.2	—	—
All others	700,044	63.8	659,055	60.1	40,989	3.7
Grand Total	1,096,839	100	1,051,497	95.9	45,342	4.1

TABLE II.

Shows periods spent by classified officials on the sick
list or on sick leave.

Nationality.	Total No. of days spent on sick list or on sick leave.
British	4,495
Other Europeans	751
Syrians and Egyptians	5,606
Sudanese	7,871
Total	18,723

TABLE III.

Registration of births and deaths by Provinces, 1927.

PROVINCE.	BIRTHS.				STILL BIRTHS				DEATHS.			
	Europeans.		Natives.		Europeans.		Natives.		Europeans.		Natives.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
Khartoum	24	22	1,837	1,705	—	1	70	45	25	7	1,184	1,383
Halfa ...	—	—	767	710	—	—	11	14	—	—	400	424
Red Sea	2	8	135	156	—	—	10	7	4	3	340	312
Berber	4	3	2,277	1,994	—	—	38	33	2	2	1,259	1,250
Dongola	—	—	2,872	2,667	—	—	149	79	—	—	1,159	1,164
Kassala	6	5	1,261	993	—	—	36	19	1	—	834	616
Blue Nile	2	3	7,856	6,096	—	—	117	65	—	1	4,783	3,779
Fung ...	—	—	1,574	1,351	—	—	21	17	—	—	1,297	982
White Nile	—	—	1,687	1,611	—	—	55	31	—	—	1,032	856
Kordofan	—	—	6,498	5,133	—	—	87	47	—	—	2,830	2,228
Bahr'-El-Ghazal	—	—	3	3	—	—	—	—	—	—	20	23
Upper Nile	—	—	55	36	—	—	2	—	—	—	57	49
Nuba Mountains	—	—	7	13	—	—	—	—	—	—	28	26
Mongalla	—	—	—	—	—	—	—	—	—	—	—	—
Darfur	—	—	75	53	—	—	—	—	—	—	236	241
Total ...	38	41	26,904	22,521	—	1	596	357	32	13	15,459	13,333
Total ...	79		49,425		1		953		45		28,792	
Grand Total ...			49,504				954				28,837	

% of still births = 1.93.

TABLE IV.

Shows the death rate per 1,000 births—Children under one year of age.

Province.								Births registered.	Deaths under one year.	Rate per 1,000.
Khartoum	...	...	...	...	...	...	...	3,588	310	86.4
Halfa	...	...	...	...	...	...	...	1,477	146	98.8
Red Sea	...	...	...	...	...	...	...	301	74	245.8
Berber	...	...	...	...	...	...	...	4,278	333	77.8
Dongola	...	...	...	...	...	...	...	5,539	430	77.6
Kassala	...	...	...	...	...	...	...	2,265	45	19.9
Blue Nile	...	...	...	...	...	...	...	13,957	471	33.7
Fung	...	...	...	...	...	...	...	2,925	87	29.7
White Nile	...	...	...	...	...	...	...	3,298	131	39.7
Kordofan	...	...	...	...	...	...	...	11,631	245	21.1
Bahr el Ghazal	...	...	...	...	...	...	...	6	—	—
Upper Nile	...	...	...	...	...	...	...	91	4	43.9
Nuba Mountains	...	...	...	...	...	...	...	20	—	—
Mongalla	...	...	...	...	...	...	...	—	—	—
Darfur	...	...	...	...	...	...	...	128	30	234.4
Total								49,504	2,306	46.6

TABLE V.

Shows the admissions and deaths by disease.

DISEASE.	TOTAL.							
	Europeans.				Natives.			
	Male.		Female.		Male.		Female.	
	A.	D.	A.	D.	A.	D.	A.	D.
Table "A"								
Tubercular								
1. Disease of lung	2	—	—	—	187	32	37	5
2. All other tubercular diseases ...	2	—	—	—	143	12	56	8
Venereal								
3. Syphilis	3	—	—	—	1,135	6	431	1
4. Gonorrhoea	20	—	1	—	1,162	—	94	—
5. Soft Sore	2	—	—	—	79	—	6	—
Eye.								
6. Trachoma... ..	—	—	—	—	137	—	43	—
7. All other eye diseases	16	—	3	—	868	417	—	—
8. Ear	3	—	—	—	79	1	11	—
9. Skin	5	—	—	—	210	—	34	—
10. Wounds and other injuries ...	85	2	4	—	4,916	66	529	17
Tumours.								
11. Malignant	—	—	2	—	52	10	47	7
12. Non-Malignant	3	—	—	—	87	2	48	1
Of Women.								
13. Gynaecological	—	—	14	—	—	—	202	4
14. Confinements	—	—	35	1	—	—	110	6
15. Poisoning	—	—	—	—	8	1	3	1
Total Table "A"	141	2	59	1	9,063	547	1,651	50
Table "B" (Tropical).								
1. Ankylostomiasis	—	—	—	—	39	2	3	—
2. Bilharziasis	—	—	—	—	468	3	8	—
3. Blackwater Fever	1	—	—	—	6	3	2	—
4. Dysentery, Amoebic	24	—	1	—	726	33	84	7
5. Dysentery, Bacillary	26	—	12	1	281	14	18	—
6. Filariasis	—	—	1	—	7	1	—	—
7. Madura disease	—	—	—	—	134	3	28	—
8. Malaria	138	—	4	—	3,911	27	198	2
9. Leishmaniasis (Kala-Azar) ...	—	—	—	—	26	3	6	2
10. Trypanosomiasis... ..	—	—	—	—	—	—	—	—
11. Yaws	—	—	—	—	4	—	2	—
12. Sunstroke... ..	1	—	—	—	5	—	—	—
13. Heatstroke	8	2	—	—	1	1	—	—
14. Guinea Worm	—	—	—	—	74	—	5	—
Total Table "B"	198	2	18	1	5,682	90	354	11

TABLE V. (Continued).

Disease.					TOTAL.							
					Europeans.				Natives.			
					Male.		Female.		Male.		Female.	
					A.	D.	A.	D.	A.	D.	A.	D.
Table " C " (Infective).												
1.	Anthrax	...	...	...	—	—	—	—	1	—	—	—
2.	Beri-Beri	...	...	...	—	—	—	—	—	—	—	—
3.	Cerebrospinal Meningitis	...			—	—	—	—	4	2	—	—
4.	Chicken Pox	...	...	...	1	—	—	—	376	—	6	—
5.	Cholera	...	...	...	—	—	—	—	2	1	—	—
6.	Dengue	...	...	...	—	—	—	—	—	—	—	—
7.	Diphtheria...	...	...	...	6	—	4	1	67	7	45	12
8.	Enteric (Including Paratyphoid)	...			2	—	1	—	64	7	10	5
9.	Erysipelas	...	...	...	—	—	—	—	6	3	—	—
10.	Gastro-enteritis of children	...			—	—	—	—	3	1	3	2
11.	German Measles	...	...	...	—	—	—	—	2	—	—	—
12.	Influenza	...	...	...	28	1	2	—	1,171	2	36	—
13.	Leprosy	...	...	...	—	—	—	—	37	1	8	1
14.	Malta Fever	...	...	...	—	—	—	—	16	2	—	—
15.	Measles	...	...	...	2	—	—	—	82	2	1	—
16.	Mumps	...	...	...	—	—	—	—	132	—	23	—
17.	Pellagra	...	...	...	—	—	—	—	2	—	—	—
18.	Puerperal Fever	...	...	...	—	—	—	—	—	—	13	1
19.	Phlebotomus	...	...	...	5	—	1	—	120	—	1	—
20.	Plague	...	...	...	—	—	—	—	—	—	—	—
21.	Pneumonia (Epidemic)	...	...	...	—	—	—	—	482	39	19	1
22.	Rabies	...	...	...	—	—	—	—	1	—	2	—
23.	Relapsing Fever	...	...	...	—	—	—	—	—	—	—	—
24.	Rheumatic Fever	...	...	...	1	—	—	—	63	—	10	—
25.	Scarlet Fever	...	...	...	—	—	—	—	—	—	—	—
26.	Tetanus	...	...	...	—	—	—	—	2	1	—	—
27.	Typhus	...	...	...	—	—	—	—	—	—	—	—
28.	Whooping Cough	...	...	...	—	—	—	—	3	—	—	—
29.	Small Pox	...	...	...	—	—	—	—	7	2	1	—
Total Table " C "					45	1	8	1	2,643	70	178	22
Table " D."												
1.	Circulatory System	...	...	...	10	—	1	—	349	57	96	15
2.	Respiratory System	...	...	...	25	—	1	—	1,365	82	140	13
3.	Alimentary System	...	...	...	78	2	4	—	1,163	65	196	19
4.	Genito-Urinary System	...	...	...	14	1	5	2	547	27	74	1
5.	Nervous System	...	...	...	8	—	1	—	267	9	59	7
6.	Scurvy	...	...	...	—	—	—	—	8	1	—	—
7.	Diabetes	...	...	...	—	—	1	1	24	1	4	—
8.	Fever of uncertain origin	...			51	—	1	—	565	24	45	1
9.	All other diseases	...	...	...	27	—	2	—	604	30	131	7
Total Table " D "					213	3	16	3	4,892	296	745	63
" " " A "					141	2	59	1	9,063	547	1,651	50
" " " B "					198	2	18	1	5,682	90	354	11
" " " C "					45	1	8	1	2,643	70	178	22
Grand Total					597	8	101	6	22,280	1,003	2,928	146

TABLE VI.

Shows births, deaths by ages and still births.

NATIONALITY.	Births.		Deaths by ages.						Total deaths.		Total still births.	
	Male.	Female.	Under 1	1-5	5-10	10-20	20-40	40-60	Over 60	Male	Female	
British ...	3	2	—	2	—	1	10	1	—	13	1	—
Greek ...	22	30	5	1	2	—	4	7	8	16	11	—
Other Europeans	13	9	—	—	—	—	1	1	2	3	1	1
Egyptians & Syrians	344	283	50	34	6	5	28	23	26	101	71	8
Natives of Sudan	26,532	22,221	2,244	4,562	1,835	2,732	5,658	5,180	6,341	15,298	13,254	585
All others ...	28	17	7	7	1	2	30	15	6	60	8	3
Total ...	26,942	22,562	2,306	4,606	1,844	2,740	5,731	5,227	6,383	15,491	13,346	596
Grand total ...	49,504					28,837				28,837		954

% deaths by ages..

8.0 15.9 6.4 9.4 19.9 18.2 22.2

TABLE VII.

Vaccinations Performed during the Year 1927.

PROVINCE.	Primary.			Re-vaccination.			Total.		
	Success.	Failed.	Unknown.	Success.	Failed.	Unknown.	Success.	Failed.	Unknown.
Khartoum	5,999	266	1,065	566	162	17	6,565	428	1,082
Halfa	662	278	7,535	34	1	1	666	279	7,536
Red Sea	1,067	556	2,394	—	—	64	1,067	556	2,458
Berber	2,277	1,157	640	106	7	—	2,383	1,164	640
Dongola	5,692	2,844	429	554	544	—	6,246	3,388	429
Kassala	11,775	2,341	3,216	—	—	—	11,775	2,341	3,216
Blue Nile	10,672	3,525	4,597	39	19	—	10,711	3,544	4,597
Fung	6,596	2,007	125	411	199	91	7,007	2,206	216
White Nile	6,986	1,414	2,596	—	—	—	6,986	1,414	2,596
Kordofan	4,836	2,544	536	627	523	—	5,463	3,067	536
Bahr-El-Ghazal	—	—	—	—	—	—	—	—	—
Upper Nile	—	—	10,364	—	—	—	—	—	10,364
Nuba Mountains	772	73	3,096	5	8	4	777	81	3,100
Mongalla	—	—	—	—	—	—	—	—	—
Darfur	—	—	—	—	—	—	—	—	—
Total	57,334	17,005	36,593	2,342	1,463	177	59,676	18,468	36,770

Total all vaccinations = 114,914

TABLE VIII.
Shows admissions and deaths in hospitals during 1927.

HOSPITAL OR DISPENSARY.	EUROPEANS.				NATIVES.			
	1926.		1927.		1926.		1927.	
	Adm.	Deaths.	Adm.	Deaths.	Adm.	Deaths.	Adm.	Deaths.
Khartoum	175	3	208	7	2,265	99	2,056	89
Omdurman	3	—	—	—	1,264	47	1,267	76
Atbara...	156	—	107	1	2,056	27	1,802	34
Port Sudan	128	6	117	4	1,982	55	1,773	46
Suakin	—	—	—	—	126	6	65	2
Merowe	1	—	—	—	475	11	768	16
Dongola	—	—	—	—	280	8	264	8
Wadi Halfa	3	—	2	—	496	8	542	21
Dueim	—	—	—	—	151	3	313	18
Wad Medani	98	—	183	1	3,166	80	3,899	125
El Obeid	2	—	3	—	799	25	1,287	31
Nahud	—	—	—	—	693	15	1,087	32
Kassala	14	2	19	1	1,377	36	2,343	51
Gedaref	—	—	—	—	272	17	240	17
Makwar	4	—	58	—	1,357	37	1,830	62
Roseires	—	—	1	—	—	—	230	8
Malakal	6	—	—	—	1,273	34	2,370	49
Kosti ...	—	—	—	—	651	9	523	10
Khartoum North	—	—	—	—	493	—	511	4
Abu Hamed	—	—	—	—	126	2	129	1
Derudeh	—	—	—	—	199	3	238	1
Port Sudan Prison	—	—	—	—	172	3	245	5
Khartoum North Prison	—	—	—	—	272	9	410	8
Talodi ...	—	—	—	—	117	5	131	2
Kurmuk	—	—	—	—	58	2	111	2
Abu Shencina...	—	—	—	—	—	—	15	—
Mefaza	—	—	—	—	39	1	29	1
Bara ...	—	—	—	—	236	3	—	—
Dilling...	—	—	—	—	165	3	504	5
Rashad	—	—	—	—	—	—	70	1
Goz Ragab	—	—	—	—	—	—	139	—
Tokar ...	—	—	—	—	—	—	87	—
Abu Deleig	—	—	—	—	—	—	2	—
Suakin Quarantine	—	—	—	—	—	—	45	7
Singa ...	—	—	—	—	588	21	—	—
Total	590	11	698	14	21,148	569	25,325	732
		1.9		2.0		2.7		2.9

TABLE IX.
Average daily constantly sick during 1927.

Hospital or Dispensary.	No. of beds equipped	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average daily through- out year
Khartoum	104	87.5	106.8	103.4	90.8	88.4	79.2	80.9	80.5	88.9	97.1	81.5	81.9	88.1
Omdurman	85	42.3	46.0	52.0	53.8	58.3	42.6	57.5	49.6	42.2	43.5	37.1	46.5	47.6
Atbara ...	85	66.8	67.3	62.3	66.7	67.1	56.3	65.0	64.6	68.3	70.4	74.7	65.4	66.2
Port Sudan	89	55.0	60.6	62.2	61.7	67.8	55.6	64.8	66.1	58.3	49.9	43.0	54.7	58.3
Suakin ...	10	5.0	3.0	1.9	.7	3.7	2.7	4.5	3.4	1.3	2.5	2.9	2.5	2.8
Merowe ...	36	18.2	20.5	23.4	22.6	29.9	25.4	25.8	30.1	37.0	28.9	31.2	30.6	27.0
Dongola...	21	9.1	11.1	9.3	10.0	9.0	9.6	12.0	11.0	10.2	12.8	8.4	9.8	10.2
Wadi Halfa	28	10.9	13.3	9.0	11.9	20.7	16.1	18.3	16.3	8.4	12.0	14.4	17.9	14.1
Dueim ...	38	9.5	13.1	11.1	10.0	14.8	21.1	24.5	21.7	11.4	17.0	15.9	17.2	15.6
Wad Medani	207	169.5	229.2	187.5	162.1	151.6	130.2	131.7	148.2	136.6	151.2	126.3	154.3	156.5
El Obeid	70	32.7	33.4	35.3	49.4	52.4	54.3	59.7	50.7	60.6	59.7	51.6	59.9	50.0
Nahud ...	36	28.6	28.2	27.3	30.6	40.8	45.3	39.8	34.3	21.7	19.1	27.5	31.7	31.2
Kassala...	82	77.0	69.2	65.6	71.4	75.3	66.4	56.7	54.5	58.5	78.7	71.5	78.1	68.6
Gedaref ...	11	10.3	11.4	17.1	4.9	3.3	6.9	8.6	10.2	6.5	10.6	8.5	9.2	9.0
Makwar	74	82.0	79.9	76.8	77.4	97.9	89.1	72.0	62.7	50.5	74.8	76.8	70.7	75.9
Roseires	20	7.1	9.6	6.9	6.5	4.2	6.9	5.5	9.7	8.1	18.8	18.2	18.9	10.0
Malakal...	90	161.1	176.0	208.6	151.7	188.8	133.5	142.1	116.6	111.3	104.0	111.7	106.7	142.6
Kosti ...	24	11.7	14.2	14.9	14.2	13.5	15.1	12.3	12.1	13.2	14.7	16.7	20.5	14.4
Khartoum North	12	11.5	11.7	10.0	9.9	11.1	10.1	12.3	14.1	12.7	14.0	10.0	11.8	11.6
Abu Hamad	6	5.0	5.2	2.5	3.3	5.5	2.5	4.8	2.0	4.2	5.4	3.0	3.0	3.9
Derudeb	4	1.6	3.5	8.2	4.0	2.7	2.6	3.0	—	5.5	4.8	5.3	2.8	3.7
Port Sudan C. Prison...	12	3.8	3.7	9.2	7.2	10.8	5.0	6.6	8.7	13.9	15.2	12.0	9.4	8.8
Khartoum North C. Prison	30	26.0	36.1	28.4	10.4	3.9	11.4	11.3	17.7	12.3	15.8	16.0	14.1	17.0
Talodi ...	16	2.2	6.6	6.9	5.0	7.6	5.4	6.5	7.2	8.5	7.1	6.5	7.0	6.4
Kurmuk	9	1.4	.6	.8	3.5	4.1	1.8	6.0	4.8	2.4	1.5	3.2	4.2	2.9
Abu Sheneina	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mefaza ...	67	.6	2.8	.7	—	—	2.5	.4	1.7	1.1	1.1	.6	.2	1.0
Dilling ...	8	23.8	44.0	41.4	33.8	35.2	21.6	10.4	10.9	10.5	16.3	29.6	28.0	25.5
Rashad ...	—	.7	2.4	2.4	4.2	2.1	3.2	5.2	2.5	3.5	3.2	3.1	4.4	3.0
Goz Ragab	2	—	—	—	—	—	—	—	—	—	—	—	—	—
Tokar ...	18	9.3	5.7	8.0	8.7	7.5	—	—	—	—	—	1.5	1.9	3.5
Abu Deleig	2	—	—	—	—	—	—	—	—	—	—	—	—	—
Suakin Quarantine	—	—	—	—	—	—	—	—	—	6	.1	—	—	.1
Total No. of beds.	1,296	970.2	1,115.1	1,093.1	986.4	1,078.0	922.4	948.2	911.9	868.2	950.2	908.7	963.3	975.5
Average daily all hospitals	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Average daily throughout year, all hospitals = 975.5

TABLE X.

RETURN OF CIVILIANS TREATED IN MILITARY HOSPITALS IN THE SUDAN

For the Year. 1927.

Hospital	In-patients.		Out-patients.	
	1926.	1927.	1926.	1927.
Shendi	75	—	6,388	—
Rumbek	382	359	6,374	18,144
Roseires	94	—	2,310	—
Bara	183	212	2,913	5,282
Rejaf	307	274	11,644	5,921
Dilling	112	—	7,472	—
Mongalla	389	401	9,410	27,390
Torit	694	655	15,942	21,265
Wau	674	783	11,773	27,400
Gallabat	41	65	1,007	1,354
Raga	160	208	3,777	4,171
Akobo	17	33	4,396	5,709
Ei Fasher	535	702	5,492	7,923
Aweil	181	109	4,539	3,533
Nimule	38	58	8,052	8,316
Geneina	212	135	2,927	2,678
Yambio	155	233	20,202	33,130
Kajo-Kaji	480	465	20,181	43,778
Meridi	—	152	—	17,789
Yei	672	632	10,802	21,044
Kadugli	5	64	424	2,843
Tembura	504	823	22,797	52,433
Nyala	103	86	3,189	4,599
Ikotos	283	399	8,847	12,682
Kapoeta	—	37	—	2,260
Taali	—	—	—	3,502
Singa	—	499	—	12,136
Trav. Hospls....	—	—	—	15,585
Total	6,296	7,384	190,858	360,867

TABLE XI.
Shows Medical Boards and Examinations held during the Year, 1927.

PLACE	Sick Leave		Service South		Invaliding		Pensionable Service		Permanent Service		Temporary Service		Check Examina- tion	Assessment of Age	Grand Total
	Recd.	Not Recd.	Fit	Unfit	Recd.	Not Recd.	Fit	Unfit	Fit	Unfit	Fit	Unfit			
Khartoum ...	15	4	35	6	81	24	80	24	140	28	38	9	87	3	574
Omdurman ...	—	—	1	—	5	2	—	—	—	—	—	—	—	1	9
Khartoum North	—	—	—	3	—	—	—	—	—	—	—	—	—	—	3
Atbara ...	1	—	—	—	57	12	25	9	32	7	7	1	29	—	180
Shendi... ..	—	—	—	—	2	—	—	—	3	—	—	—	—	—	5
Port Sudan	7	1	1	—	68	4	20	10	23	3	1	—	10	—	148
Suakin ...	—	—	—	—	—	—	—	—	3	—	—	—	—	—	3
Tokar ...	—	—	—	—	2	—	—	—	—	—	—	—	—	—	2
Wad Medani	—	—	—	1	16	3	19	2	12	—	5	—	14	2	74
Makwar ...	—	—	—	—	7	1	7	1	3	—	—	—	3	—	22
Merowe ...	—	—	7	1	8	2	5	—	2	1	1	—	1	—	29
Debba... ..	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
Dongola ...	—	—	—	—	1	—	2	3	1	—	1	—	—	—	8
Gureir ...	—	—	—	—	—	—	—	—	—	1	—	—	—	—	1
Singa ...	—	—	—	—	1	—	3	—	2	—	—	—	—	—	6
Malakal ...	3	—	—	—	10	1	3	—	—	—	—	—	—	—	18
El Obeid ...	—	—	1	—	—	1	12	2	5	—	—	—	—	1	21
Rahad ...	—	—	1	—	—	—	—	—	—	—	—	—	—	—	1
Abu-Zabad...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
Wadi-Halfa	—	—	—	—	2	—	1	—	—	—	4	1	—	—	8
Abri ...	1	—	—	—	—	—	—	—	—	—	—	—	—	—	1
Kassala ...	—	—	1	2	2	—	3	3	1	—	—	—	—	—	12
Gedaref ...	—	—	—	—	2	—	—	—	1	—	—	—	—	—	3
El-Fasher ...	—	—	—	—	2	—	1	—	5	—	—	—	—	—	8
Nyala ...	—	—	—	—	—	—	1	—	—	—	—	—	—	—	1
Geneina ...	1	—	—	—	—	1	1	—	—	—	—	—	—	—	1
Kebkebia ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
Talodi ...	—	—	—	1	1	—	1	—	1	—	—	—	—	—	4
Kadugli ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
El Dueim ...	—	—	2	2	—	—	—	—	1	—	—	—	—	—	5
Wau ...	1	—	—	—	—	—	1	—	3	—	—	—	—	—	5
Mongalla ...	—	—	—	—	—	—	2	—	—	—	—	—	—	—	2
Rejaf ...	—	—	—	—	—	—	—	—	—	—	—	—	1	—	1
Yei ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2
Egypt *	32	3	—	—	1	1	2	—	2	—	58	—	—	—	98
Syria *	9	2	—	—	—	—	1	—	7	—	—	—	—	—	18
London*	71	9	—	—	1	—	—	—	173	—	—	—	—	—	254
Italy ...	1	—	—	—	—	—	—	—	—	—	—	—	—	—	1
TOTAL ...	142	19	49	16	269	52	190	56	421	40	115	11	145	7	1,532

* By Sudan Government Representatives.

TABLE XII.

Shows Receipts, In-patients, Out-patients, Operations during 1927.

Province.	Hospital or Dispensary.	In-patients.		Out-patients.		Hospital Charges.		Sale of Medicines.		Total Receipts.		Operations.	
		1926	1927	1926	1927	1926	1927	1926	1927	1926	1927	1926	1927
Berber...	Athara ...	2,212	1,909	38,800	43,103	667	898	361	405	1,928	1,303	201	174
	Abu Hamad ...	126	129	11,389	11,025	14	13	13	14	27	27	2	8
	Berber ...	—	—	15,154	22,376	—	6	25	30	25	36	—	—
	Damer ...	—	—	6,804	7,876	—	1	—	—	—	1	—	—
	Slendi ...	—	—	5,513	23,427	—	29	21	47	21	76	—	—
Blue Nile	Trav. Hosp. ...	—	—	20,400	1,566	—	—	—	52	—	52	—	—
	Wad Hamid ...	—	—	1,430	2,169	—	—	—	—	—	—	—	—
	Zeidab ...	—	—	2,627	—	—	—	—	—	—	—	—	—
	Wed Medani ...	3,264	4,082	12,911	33,131	1,632	1,731	482	629	2,114	2,360	146	314
	Makwar ...	1,361	1,888	5,266	8,321	285	318	98	105	383	423	330	351
	Hag Abdulla ...	—	—	2,607	3,069	—	—	3	6	3	6	—	—
	Kanlin ...	—	—	4,481	5,166	—	—	6	6	6	6	—	—
	Managil ...	—	—	1,181	1,637	—	—	—	—	—	—	—	—
	Rufaa ...	—	—	5,732	9,759	—	—	—	—	—	—	—	—
	Sagadi ...	—	—	—	—	—	—	—	—	—	—	—	—
	Sennar ...	—	—	477	—	—	—	—	—	—	—	—	—
	Abdel Galil ...	—	—	382	1,444	—	—	—	—	—	—	—	—
	Abdel Hakam ...	—	—	403	2,559	—	—	—	—	—	—	—	—
	Abdel Rahman ...	—	—	466	2,420	—	—	—	—	—	—	—	—
	Derwish ...	—	—	258	825	—	—	—	—	—	—	—	—
Dongola	El Radma ...	—	—	466	2,184	—	—	—	—	—	—	—	—
	El Renitab ...	—	—	498	1,908	—	—	—	—	—	—	—	—
	Ghubshan ...	—	—	684	2,694	—	—	—	—	—	—	—	—
	Hamad El Nil ...	—	—	467	2,451	—	—	—	—	—	—	—	—
	Hoshi ...	—	—	1,317	2,713	—	—	—	—	—	—	—	—
	Konor ...	—	—	374	2,228	—	—	—	—	—	—	—	—
	Medina ...	—	—	496	4,796	—	—	—	—	—	—	—	—
	Nidana ...	—	—	498	1,818	—	—	—	—	—	—	—	—
	Sabi Delaib ...	—	—	—	1,080	—	—	—	—	—	—	—	—
	Selcima ...	—	—	1,557	4,510	—	—	—	—	—	—	—	—
	Tayiba ...	—	—	982	2,323	—	—	—	—	—	—	—	—
	Tebub ...	—	—	446	1,997	—	—	—	—	—	—	—	—
	Wad El Atia ...	—	—	820	3,897	—	—	—	—	—	—	—	—
	Wad Naaman ...	—	—	460	1,993	—	—	—	—	—	—	—	—
	Wad Saadalla ...	—	—	395	2,528	—	—	—	—	—	—	—	—
Wad Sulfab ...	—	—	475	2,892	—	—	—	—	—	—	—	—	
Halfa ...	Merowe ...	476	768	30,508	24,160	150	218	124	93	274	311	101	182
	Dongola ...	280	264	23,401	34,201	79	69	58	41	137	110	79	88
	Argo ...	—	—	13,584	17,396	—	—	—	22	—	22	—	—
	Debba ...	—	—	7,511	11,132	—	—	2	27	2	27	—	—
	El Seir ...	—	—	591	10,129	—	—	—	1	—	1	—	—
	Ghaba ...	—	—	—	3,178	—	—	—	3	—	3	—	—
	Karcima ...	—	—	15,146	12,633	—	—	14	12	14	12	—	1
	Mansurkoti ...	—	—	12,946	12,946	—	—	—	9	—	9	—	—
	Nuri... ..	—	—	17,688	12,746	—	—	—	16	—	16	—	—
	Wadi Halfa ...	499	544	30,116	31,562	954	140	76	57	1,030	197	73	36
	Abri ...	—	—	5,001	7,316	—	—	—	1	—	1	—	5
	Delgo ...	—	—	3,130	2,110	—	—	—	—	—	—	—	—
	Singa ...	588	—	11,373	—	180	66	74	28	254	94	32	27
	Rosieres ...	—	231	6,400	—	—	—	—	4	—	4	—	—
	Abu Shenema ...	—	15	1,294	1,859	—	—	—	—	—	—	—	—
Karkoj ...	—	—	5,659	5,298	—	—	—	—	—	—	—	—	
Kassala	Kurmuk ...	58	111	4,710	5,183	—	8	25	12	25	20	—	—
	Kassala ...	1,391	2,362	26,191	31,740	494	580	348	388	842	968	329	403
	Gedaref ...	272	240	10,370	8,853	80	84	95	85	175	169	32	6
	Abu Deleig ...	—	—	2,978	3,972	—	—	3	—	3	—	—	—
	Aroma ...	—	—	1,234	3,999	—	—	—	—	—	—	—	—
	Derudeb ...	199	238	5,905	6,240	—	—	1	5	1	5	—	—
	Goz Rageb ...	—	139	1,942	4,292	—	—	2	—	2	—	—	—
	Haiya ...	—	—	3,515	493	—	—	—	—	—	—	—	—
	Hadaliya ...	—	—	1,696	4,579	—	—	—	—	—	—	—	—
	Khashim El Girba ...	—	—	1,752	5,198	—	—	—	1	—	1	—	—
	Mafaza ...	39	29	2,777	4,730	—	—	5	3	5	3	—	—
	Magouda ...	—	—	2,502	3,411	—	—	1	—	1	—	—	—
	Mekali ...	—	—	3,827	5,417	—	—	—	—	—	—	—	—
	Khartoum ...	2,440	2,264	40,124	37,066	1,633	1,642	431	695	2,064	2,337	466	418
	Omdurman ...	1,267	1,267	49,258	53,763	734	576	486	570	1,220	1,146	224	207
Khartoum North ...	493	511	21,486	30,108	90	90	213	278	303	368	13	18	
Kordofan	Khun. Nor. Prison ...	272	410	9,610	9,730	—	—	—	—	—	—	9	8
	Gebel Aulia ...	—	—	6,173	1,237	—	—	—	—	—	—	—	—
	Gelli... ..	—	—	1,744	7,092	—	—	—	1	1	—	—	—
	El Obeid ...	801	1,290	40,249	41,368	460	500	509	461	969	961	178	238
	Nahud ...	693	1,087	11,007	18,886	251	238	263	210	514	448	63	106
	Abu Zabab ...	—	—	12,102	17,271	—	—	—	—	—	—	—	—
	Bura ...	236	—	4,104	—	—	—	—	—	—	—	—	—
	Muglad ...	—	—	3,803	6,518	—	—	—	—	—	—	—	—
	Rahad ...	—	—	12,652	15,127	—	—	—	—	—	—	—	—
	Sodeiri ...	—	—	3,497	3,845	—	—	—	—	—	—	—	—
	Trav. Hosp. ...	—	—	20,392	—	—	—	—	—	—	—	—	—
	Um Ruaba ...	—	—	9,169	12,082	—	—	—	4	—	4	—	4
	Nuba Mountains	Tabadi ...	117	131	9,978	12,577	—	—	2	—	2	2	4
	Dilling ...	165	504	15,807	27,859	—	—	—	—	—	—	4	9
	Rashad ...	—	70	6,891	8,739	—	—	—	—	—	—	—	3
Red Sea...	Port Sudan... ..	2,110	1,890	41,270	35,831	1,477	1,448	637	574	2,114	2,022	329	220
	Suakin ...	126	65	10,134	7,996	21	17	28	54	49	71	7	—
	Tokar ...												

TABLE XIII.

Statement of estimated expenditure during the year 1927 and Budgetary estimates for 1928.

Item.	1927. Actual Expenses £E.	1928. Budget Estimates £E.
Personnel :—		
1. HEADQUARTERS :—		
(a) Classified ...	8,253	14,360
(b) Unclassified ...	466	473
2. HOSPITALS :—		
(a) Classified ...	37,869	42,348
(b) Unclassified ...	8,830	9,324
3. QUARANTINE :—		
(a) Classified ...	2,339	2,388
(b) Unclassified ...	1,151	1,195
4. SLEEPING SICKNESS :—		
(a) Classified ...	7,928	8,988
(b) Unclassified ...	495	615
5. GEZIRA SCHEME :—		
(a) Classified ...	2,685	3,096
(b) Unclassified ...	3,717	3,749
6. BILHARZIA AND OPHTHALMIC TRAVELLING HOSPITALS :—		
(a) Classified ...	707	3,964
(b) Unclassified ...	—	3,606
Allowances and Services :—		
1. Headquarters ...	46,117	52,167
2. Hospitals ...	26,728	27,016
3. Quarantine ...	2,932	3,878
4. Sleeping Sickness ...	4,347	6,981
5. Gezira Scheme ...	6,995	8,470
6. Bilharzia and Ophthalmic Hospitals ...	743	6,629
	162,302	199,247
To be recovered from other sources ...		16,856
		182,391

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